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ABSTRACT

The unit on beef cattle production is designed primarily for the adult farmer program in Kentucky as an aid to making the beef enterprise more profitable. It is aimed primarily at the commercial producer. The lessons center on some of the more important economic points in beef cattle production. Ten lessons comprise the unit, which can be adapted for local needs and situations: (1) selection and breeding for increased herd production, (2) controlling costs, (3) increasing birth rate, (4) raising calves to weaning, (5) feeding, (6) producing replacement heifers, (7) maintaining health of herd, (8) managing the stocker program, (9) equipment needs, and (10) comprehensive management planning. Several suggestions for supplementary enrichment activities are listed for each lesson. Several forms and a course evaluation instrument are appended. (VA)

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BEEF CATTLE PRODUCTION

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An Instructional Unit for Teachers
of Adult Vocational Education in Agriculture

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FOREWORD

Mr. Bruce Metzger, teacher of vocational agriculture at Woodford County High School, brings to this publication an excellent background in beef production. He is a graduate of the University of Kentucky, where he majored in animal science. He has taught six years at Woodford County, all of which included young- or adult-farmer work, many in the livestock area. The Woodford FFA chapter, which Mr. Metzger ably advises, conducts a local beef show each year and has a consistently excellent record in area and state beef shows and cattle judging contests.

This adult-farmer course is a result of the following sequence of actions:

1) The State Advisory Committee, made up of agriculture teachers, State staff, and teacher educators from throughout Kentucky, was organized to determine needs and program direction for adult work in agriculture for the State. A major outcome of the first meeting in September, 1971, was a recommendation that more instructional materials that are specifically designed for teaching adults in agriculture be developed and distributed to teachers.

2) Subsequently, a proposal to involve experienced teachers of adults in material development was written by Dr. Maynard Iverson of the University of Kentucky and submitted for State funding. In January, 1972, a two-year, $15,000 grant was made through the Supporting Services Division, Bureau of Vocational Education, State Department of Education.

3) Twelve teachers were selected to produce units in the areas of need during the term of the project. Mr. Metzger's unit, "Beef Cattle Production," is a product of that effort.

This publication, along with future materials developed specifically for the teaching of adults employed in agriculture in Kentucky, should

improve the teaching of adult classes in agriculture and stimulate the initiation of additional classes.

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We are grateful to the following for their valuable assistance with the unit: Dr. Neil Bradley, Head of the Beef Cattle Division, and Dr. Nelson Gay, Professor of Animal Science, Department of Animal Science, University of Kentucky; Drs. Newell Hicks, Don Applegate, and James Boutcher, Veterinarians, Woodford Veterinary Clinic, and prominent beef cattle authorities; Dr. Frank A. Pattie, Professor Emeritus, University of Kentucky for the cover photograph and critical review of the manuscript; Mrs. Anne Mills, Miss Susan Roberts, and Mrs. Mitzi Iverson, Typists, University of Kentucky; Mr. Raymond Gilmore and Mr. Steve Statzer, Artists, and Dr. Herbert Bruce, Director, Curriculum Development Center, University of Kentucky; Dr. Robert Schneider, Director, Educational Resources Development Unit, Bureau of Vocational Education, Frankfort, and the many authors and agencies whose publications were utilized in the unit.

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SUGGESTIONS FOR USING THE COURSE

This unit on beef cattle production is designed primarily for the adult farmer program. It is centered in some of the more important economic points in beef cattle production and is aimed primarily for the commercial producer.

Adaptation for local needs and situations with selection and use of the problems in this unit is highly recommended. The unit covers a vast subject, thus there is room for considerably more development on each problem than is presented. Instructors should supplement this material with local references and resource people.

Beef production is a field which enjoys continual improvement, which means that this unit will need to be updated from time to time as it is used.

Beef Cattle Production is designed to help improve and update the beef producers in Kentucky, eventually making the beef enterprise more profitable.

The format used was designed to assist teachers in utilizing problem-solving and the discussion method. A teaching procedure that has been used successfully is as follows: Step 1: The teacher lists the topic (problem and analysis) on the chalkboard. Step 2: He then sets the stage for discussion with introductory facts, ideas, or comments, using items from the section on "developing the situation." Step 3: The teacher calls on the class to give their experiences, ideas, and knowledge concerning the subject. The discussion is supplemented with handouts, transparencies, models, or other inputs gathered by the teacher beforehand to help solve the problem under consideration. Resource people or films may also be used at the end of each lesson in the unit. Step 4: When the facts have been brought out and a good discussion has taken place, the teacher leads the group to appropriate conclusion. These summary statements are written on the chalkboard and, in some cases, are typed up and distributed as handouts at the next meeting. Some instructors will utilize devices such as panels, exhibits, and tours to reinforce the conclusions reached. (Several suggestions for supplementary enrichment activities are listed in each lesson of this unit.)

Each teacher using the unit is asked to complete and return the evaluation questionnaire found in the Appendix. These ratings and suggestions will be used to improve this unit as well as others developed in the future.

Our best wishes for a successful adult program.

Bruce Metzger
Development Consultant

Maynard J. Iverson
Project Director

UNIT OBJECTIVES

The following objectives should be reached by each individual enrolled --

Major objective: To develop the effective ability of Kentucky farmers to manage the beef cattle enterprise for optimum production.

Lesson objectives: To develop the effective ability of farmers to --

1. Select beef animals that will increase production.
2. Control the costs of producing beef.
3. Increase the calf crop from the beef herd.
4. Wean heavier beef calves.
5. Recognize and make the most efficient use of the feed requirements of the beef cow.
6. Produce replacement heifers.
7. Manage the health of the beef cow herd.
8. Manage a stocker program in beef production.
9. Select, design, and use beef equipment properly.
10. Adopt a comprehensive beef management plan.

UNIT REFERENCES

Books

Animal Sanitation and Disease Control, by Dystra, (The Interstate) 1961.

Approved Practices in Feeds and Feeding, by Cassard and Juergenson, 3rd Edition, (The Interstate Printers and Publishers, Danville, Illinois) 1963.

Approved Practices in Pasture Management, by McVichar and McVichar, (The Interstate) 1966.

Beef Cattle Science, by Ensminger, 4th Edition, (Interstate Printers and Publishers, Danville, Illinois) 1968.

Beef Production, by Bundy and Diggins, 3rd Edition, (Prentice-Hall, Englewood Cliffs, New Jersey) 1971.

Beef Production in the South, by Fowler (The Interstate).

Handbook of Livestock Equipment, by Juergenson, 1st Edition, (The Interstate Printers and Publishers, Danville, Illinois) 1971.

Livestock and Poultry Production, by Bundy and Diggins, 3rd Edition, (Prentice-Hall, Englewood Cliffs, New Jersey) 1968.

The Artificial Insemination of Farm Animals, by Perry, 4th Edition, (Rutgers University Press, New Brunswick, New Jersey) 1968.

The Marketing of Livestock and Meat, by Fowler, 2nd Edition, (The Interstate) 1961.

Cooperative Extension Bulletins

Proceedings, Beef Cattle Field Day, UK, 1972.

Series on Beef Production

(Bulletins by Kentucky Cooperative Extension Service, and the Departments of Animal Sciences, Agricultural Economics and Veterinary Science, University of Kentucky.)

INTRODUCTORY MATERIAL

The following points may be brought out to introduce this unit. It is hoped that these statements will stimulate interest and help to develop a meaningful purpose for further study.

1. The beef animal must be considered as a conversion machine that can use the raw materials in its daily feed supply and convert them into a finished, marketable product -- meat.

2. The profit from beef farming is dependent upon the percentage of cows giving birth to live calves, the percentage of live calves raised, the rate of gain in body weight, and the conditioning and fattening qualities experienced from the conversions of such raw feed materials into meat, consistent with the most favorable costs involved.

3. In order to experience the most satisfactory results from a beef farming enterprise, it is of first importance that all elements that govern and regulate the health of the animals, and which sustain and maintain the highest degree of functional efficiency, be supplied in ample amount and proper balance. To insure this, it is necessary that the animals be provided at all times with a satisfactory source and supply of each and all of the essential structural, functional, and protective mineral elements.

4. In order to promote the greatest efficiency of nutrient conversion from the animal's daily diet, it is essential that satisfactory levels of Vitamins A, E, and D be supplied in the daily ration. These vitamins are activators which furnish the ignition for the digestive processes. They furnish the vital spark to the animal's combustion engine.

5. After the animal's daily ration provides satisfactorily the essential minerals and vitamins, next consideration must be given to sup-

plying the exact amount of protein needed. The protein constituents in the total ration provide the "grow power" to the animal's body organism. Without protein, there can be no life, for it is the function of protein to create, develop, and maintain the cells of the body.

6. After all the afore-mentioned essential minerals, vitamins and the protein constituents have been amply provided, the rest of the ration may then be filled with the carbohydrate and fat constituents necessary to support, maintain, and extend the body cells after they are developed. It is because of its carbohydrate and fat content that corn has its most significant value -- for maintaining, conditioning, fattening, and finishing any form of livestock.

7. The average beef animal has a digestive capacity to consume 3 lbs. of dry weight feed daily for each 100 lbs. of body weight. Thus, a 300 lb. animal can consume 9 lbs. of dry weight feed daily; a 500 lb. animal can consume 15 lbs.; an 800 lb. animal 24 lbs.; and a 1000 lb. animal 30 lbs., etc.

8. By providing a properly balanced daily ration wherein all of the essential nutrient elements - minerals, vitamins, and the protein, carbohydrate, and fat constituents are supplied in proper balance, a gain of 1 lb. of body weight may be expected from each 5 lbs. of total digestible nutrients (TDN) consumed.

9. For best results, therefore, it is necessary that the animal be fed a ration that will provide the largest amount of total digestible nutrients in the limited amount of dry weight feed that the animals can consume daily -- always in proper balance with respect to each and all of the essential nutrients required.

x

Lesson 1

INCREASING BEEF PRODUCTION THROUGH IMPROVED SELECTION AND BREEDING

Objective -- To develop the effective ability of farmers to select beef animals that will increase production.

Problem and Analysis -- What selection factors will increase production?

-Production records of the herd
-Use of weight-tested bulls
-Influence of crossbreeding
-Use of artificial insemination

Content -- (Subject matter for teacher preparation)

I. Production Records of the Herd

A. A good record system will pay large dividends in all herds. This is especially true for producers who raise and keep their own replacement heifers. A good record system will require a practical system of individual identification.
   1. Ear tattoos. The most permanent system.
   2. Neck chains. Not used much at present.
   3. Ear tags. Very popular and much safer and easier to use than neck chains.
   4. Branding is becoming popular in Kentucky. (See ASC-11 bulletin.)

B. A sound and reliable selection program will need some type of good record system for its foundation. The most efficient way is to keep an individual record of each cow's production. The most important points are:
   1. Breeding Date. This will indicate the hard breeders and also reveal the more fertile cows that breed early. This is important to know when culling cows.
   2. Calving Date. For proper birth records and registration.
   3. Sire of calf. This may reveal why some calves outperform others when more than one bull is available.
   4. Condition of calf. A record of any difficulty in parturition, or any other health problem.
   5. Rebreeding date. This is valuable if pregnancy testing is done. With only one product to sell -- the calf -- a cow cannot recover the cost of keeping her for a year (cost of $90-$100 per cow) unless she settles, delivers a live calf, and goes on to wean that calf.
   6. Weaning weight of the calf. This gives an indication of the productive ability of the cow. This information

should be adjusted to a standard formula found in ASC.

7. Market grade of the calf produced. This will also indicate the quality of production.

II. Use of Weight-Tested Bulls

A. A "weight-" or "performance-" tested bull is certified for the following factors:

1. Weaning weight (adjusted to 205 days). Actual weaning weight may also be provided.
2. Yearling weight (adjusted 365-day weight). This weight may be affected by the way the producer handles bulls from weaning to yearling age. Consider this point when looking at yearling weights.
3. Average daily gain (ADG). This tells you how much weight gain the animal averaged during the period he was feed tested. Again, compare the way he was fed and the way you plan to handle his offspring before you anticipate how much he can affect the weights of your calves.
4. Weight per day of age. Tells you how much he gained (on the average) every day during the test period. This information is most useful when based on a definite period or time, usually 365 days. If no set time standard is used, it is rather difficult to compare, since because growth patterns and gain patterns change at different stages of life.
5. Conformation grade. Reflects the individual quality of the animal. (See Kentucky Bulletin ASC-3, ASC-4, and ASC-5 for additional information.)

B. Knowing the weights and grades of the calves you have produced will give you a starting point from which to select herd bulls.

C. Select a herd bull with an average weaning weight that is above herd average. See Reference ASC-3 to determine how much increase can be expected from "genetic research."

III. Effect of Crossbreeding on Production

A. Types of crossbreeding.

1. Purebred bull crossed on mixed-breed cows.
2. Two-breed cross.
3. Three-breed cross.

B. General tendencies of crossbreeding.

1. Heterosis, also called hybrid vigor, is produced.
   a. Heterosis can be described as the frosting on the cake. It's a gain that you didn't expect to get from simply averaging the performance of the two parent breeds.
   b. Heterosis can be calculated with the following formula: Percent of Heterosis = Crossbred average

for a particular trait - the straightbred average for that trait X 100 + straightbred average.

c. For examples of crossing effects, see masters at the end of the lesson.

2. Permits rapid incorporation of desirable genetic material.

3. Allows the desirable traits of two or more breeds to be combined into one animal.

C. Systems of crossbreeding. Several systems can be used to realize the benefits of crossbreeding. The actual number of systems is limitless. Here we will take a look at two-breed crosses and the three-breed crosses.

1. Two-breed static crosses.

a. Advantages:

(1) Simple system to handle.
(2) Uniform progeny produced year after year.
(3) Simplifies selection of breeding stock.
(4) Gives opportunity to choose specialized sire-breed and specialized female breed.
(5) Maximum heterosis results in calves.
(6) Provides opportunity to combine the desirable traits in two breeds.

b. Disadvantages:

(1) Does not utilize heterosis in the cow.
(2) Replacements must be purchased or a straightbred herd maintained.
(3) Purchasing replacements increase possibility of introduction of disease.
(4) Calving problems may result if proper size-selection is not followed.
(5) Genetically superior replacements are hard to locate and purchase.

2. Two-breed rotational crosses.

a. Advantages:

(1) Harvests two-thirds of the heterosis possible in the two-breed-cross calf and two-thirds of the maternal heterosis possible in the two-breed-cross cow.
(2) Replacement females can be raised on the farm.
(3) Selection for superior replacements can be made in the herd.
(4) Little disease risk.

b. Disadvantages:

(1) Cows must be grouped and maintained in groups according to their sires, unless artificial insemination is used.
(2) Since females are of mixed breeding, it is not possible to choose specific sire and dam breeds.
(3) There is a one-third reduction in heterosis in both calf and cows of this cross as compared to crosses involving straightbreds.

3. Three-breed crosses.
   a. Advantages:
      (1) There is a full expression of heterosis in both cow and calf.
      (2) Producers can select specific sire and dam breeds.
      (3) A uniform calf crop is produced.
      (4) The strong points of three breeds can be combined into one individual.
      (5) Specific sire breeds can be selected and used with profitable results.
   b. Disadvantages:
      (1) Breeding stock, both male and female, must be periodically replaced by purchasing or maintaining a portion of the cow herd to raise replacements.
      (2) Purchased replacement stock may introduce health hazards.
      (3) Genetically superior breeding stock may be difficult to locate and purchase.
      (4) Calving difficulty may result when breeds that differ greatly in size are crossed.

IV. Use of Artificial Insemination

A. AI is the newest revolution in the beef breeding business.

B. Advantages of AI.
   1. Allows farmers to use carefully selected sires, picked from selected matings (finding outstanding females and mating them to outstanding bulls). They are selected for AI studs according to their individual performance ability, and remain with AI studs as a result of repeated success in continual progeny performance testing.
   2. This type selection allows farmers to use semen from bulls that are much stronger and genetically superior to any bull most farmers could afford to buy.
   3. Cost per service is very small when compared to the amount of improvement received in the calf crop.

C. Disadvantages in using AI.
   1. Ability to use the AI service method may be a problem for many farmers.
   2. Detecting cows in heat is a problem for many farmers.
   3. A holding facility is needed.

D. AI management suggestions.
   1. Beef managers should attend an AI school and learn how to use it.
   2. A definite period should be set up when time can be allotted to use AI effectively.
   3. A teaser bull with a marker (chin ball marker) should be used to detect cows in heat.

4. Cows coming into breeding season should be given proper rest and management.
5. Breeding should continue for 45 to 60 days, and then a clean-up bull should be used. This keeps cows from getting spread out too much at calving time and allows farmers time for other things.

Suggestions for Teaching the Lesson

I. Developing the Situation

A. Things to be brought out by the teacher:
1. There is a new trend in the beef business today toward raising larger, faster-growing cattle.
2. The introduction of the exotic breeds has given producers a new supply of breeding stock (primarily bulls) to choose from and use in beef production.
3. There are several ways, when good management is applied, that producers can benefit from using animals that have been bred for faster growth, whether they are of the exotic breeds or the English breed that we have used for years.

B. Things to be brought out by class members:
1. What selections are used in their herds to improve production.
2. Which factors have given the most improvement.
3. Experiences with crossbreeding and AI.

II. Conclusions

A. When improving production through selection we must first establish a starting point so that the progress that results can be measured in a meaningful manner.

B. The foundation of a progressive selection program is a realistic, well-kept set of records that measure the heritable traits that affect and influence higher production and increase profits the most.

C. Individual records are most useful for cows maintained in the herd or when replacement heifers are kept from the herd. Individual records are not very effective in herds where there is a fast turnover of cows. Where cows are usually kept for only one or two calving seasons, a financial record of purchase price and total sales from each animal unit (cow and calf) is about the only measure of success or failure.

D. The most useful record to use when selecting bulls is performance or growth data. The most highly heritable traits that are related to increased production should head the list of selection factors. A check of the bull's fertility and serviceability before the breeding season will help in-

sure the beef producer of earlier calves that will weigh heavier at market time.

E. Once the bull and the females have been decided upon, it is time to look at the most desirable way of mating to again attempt to increase production.

F. Production can be increased by as much as 20 percent when cross-breeding is used. There are three main genetic benefits from cross-breeding:
   1. Hybrid vigor (heterosis).
   2. Rapid introduction of desirable genetic material.
   3. Incorporation of the desirable traits of two or more breeds into one animal. There is a limitless number of cross-breeding systems that can be developed by beef producers.

III. Enrichment Activities

A. Attend a performance-testing station and/or a performance-tested bull sale.

B. Secure a speaker on production records, such as an Extension specialist.

C. Conduct an AI school.

IV. Suggested Teaching Materials

A. References
   1. Beef Cattle Science, Ensminger, 4th Edition, chapters 5-7.
   2. Livestock and Poultry Production, Bundy and Diggins, pp. 204-209.
   3. Animal Science, chapter 11.
   4. Proceedings, 1972, Beef Cattle Day, University of Kentucky.
   5. The Artificial Insemination of Farm Animals, Perry, ch. 9.
   6. Kentucky Extension Bulletins, ASC-3, 4, 5, 6 and 11.

B. Audio-visuals
   1. Masters*
      -1 Weight averaging
      -2 Heterosis in beef cattle
      -3 Production of straightbred versus crossbred cows

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*NOTE: Masters are keyed to lessons and are numbered consecutively. The code number appears in the lower right hand corner of each sheet. Master 106-1-1A indicates: adult unit number 106, lesson 1, item 1, part A.

Table 1 -- Weight Average Chart

		Dam A	Breed B
Sire	A	AA 440#	AB 444
Sire	B	BA 460	BB 420

To use the formula we calculate: the average of the straight-breeds AA and BB.

$$\frac{440 + 420}{2} = \frac{860}{2} = 430\#$$

The average of the crossbreds.

$$\frac{\begin{matrix}AB \\ 444\end{matrix} \quad + \quad \begin{matrix}BA \\ 460\end{matrix}}{2} = \frac{904}{2} = 452$$

The difference due to crossbreeding is

$$\begin{matrix} 452 \\ -\ 430 \\ \hline 22\# \end{matrix}$$

$$\frac{(452 - 430) \times 100}{430} = \frac{22 \times 100}{430} = \frac{2200}{430} = 5.1\%$$

106-1-1

Table 2 -- Heterosis for several traits of beef cattle.

Trait	% increase from crossbreeding over straight breeds
Calving percent	1.9%
Calf survival	2.7%
% Calf Crop Weaned	4.3%
Weaning Weight	4.7%
Post-Weaning Weight	2.4%
Yearling Weight (Steers)	4.2%
Yearling Weight (Heifers)	5.7%
Feed Efficiency	0.6%
Carcass Grade	1/7 Grade

Note: These estimates were taken from straightbred cows giving birth to straightbred calves versus straightbred cows giving birth to crossbred calves.

Table 3 -- Productivity of Straightbred Cows Versus Crossbred Cows.

Trait	Advantage of Crossbreds over Straightbreds
Calving %	4.7%
% Calf Crop Weaned	4.8%
Calf Weaning Weight	5.0%

Lesson 2

CONTROLLING COSTS OF PRODUCING BEEF

Objective -- To develop the effective ability of farmers to control the costs of producing beef.

Problem and Analysis -- How can we control costs of producing beef?

-Economics of purchasing breeding stock
-Maintenance costs of breeding stock
-Feed costs
-Health costs

Content

I. Economics of Purchasing Breeding Stock

A. Average productive life of a commercial female is about five years. This will allow the cow to be about seven years of age at time of culling assuming she is two years old when her first calf is dropped.

B. If the cow is purchased instead of raised, she should not cost more than (1) the sum total of two of her offspring on the commercial market or (2) the sum total of one offspring plus her market salvage value.

C. Sire costs are usually discussed every time cattle men gather to talk about bulls.

D. The first thing to consider in selecting a sire is to decide what you want this sire to do for your herd.
1. Improve weaning weights.
2. Improve grade of weaned calves.
3. Improve pedigrees for registered cattle.
4. Improve productivity of replacements.

E. Improvement from the sire should be reasonably estimated to determine the value of improvement per calf. This value should be multiplied by the number of calves to be marketed to determine the value of improvement per year. This figure should, in turn, be multiplied by the number of years you plan to use the bull.

II. Maintenance Costs of Breeding Stock

A. Sire costs are less on a per-calf basis since one bull may sire 30 or more calves.

1. Pasture charges should be made during the breeding season.
2. Protein and grain costs should be higher for bulls since good condition is very essential for a vigorous breeding male.

B. Dam cost will be affected by the season of the year the cow calves.
   1. Feed requirements are higher for fall calving cows than for spring calving cows.
   2. The following illustrates the expected maintenance cost of a spring calving cow that will produce a 500-pound calf at weaning.*

Feed Costs	Expected	Actual
2 ton hay @ $35/ton	$ 70.00	
3 ton pasture @ $10/ton	30.00	
5 bu. corn @ $2/bu.	10.00	
Total Feed Costs	$110.00	
Other Costs		
Power and Fuel	3.00	
Vet and Drugs	3.00	
Marketing	5.00	
Total	$11.00	
Overhead Costs		
Depreciation and Repair	2.50	
Interest		
Building and Equipment	2.00	
Livestock (depreciation cost)	17.50	
Taxes, Insurance and Breeding	9.00	
	$31.00	
Labor (12 hours)	24.00	
Total Cost	$176.00	
500-pound Calf at 45¢ =	225.00	
Profit	$49.00	

   3. For maintenance cost for fall calving cows add to the spring calving costs:

Feed Cost	
5 bu. of corn @ $2/bu.	$10.00
150 pounds Supplement @ $8/cwt.	12.00
Additional Feed Cost	22.00

*Note: Adjust all figures to present market situation.

Other Costs				
Power and Fuel	$4.00	instead	of	$ 3.00
Vet and Drugs	4.00	"	"	3.00
Marketing	5.00	"	"	5.00
	$13.00	"	"	$11.00
Overhead Costs				
Depreciation and Repair	4.00	instead	of	2.50
Interest				
Building and Equipment	4.00	"	"	2.00
Livestock	17.50			17.50
Taxes, Insurance and Breeding	9.00			9.00
	34.50	"	"	11.00
Total Costs				$203.50

III. Feed Costs Per Calf.

A. The amount of feed needed per calf will depend on:
   1. Milk supply of the mother cow. This is a most important trait to select for and maintain in beef-cow herds.
   2. When calf is born.
      a. Spring-born calves (January - April) from good milking cows should make desirable market weights in 6 to 8 months with no additional feed.
      b. Summer-born calves (May - August) may possibly have to be wintered in ordered to grow out to desirable market weights and sell at desirable marketing times.
      c. Fall-born calves (Sept. - Dec.) will require some feed, since the pasture season in Kentucky does not start until they have reached 6 - 8 months of age.
   3. When the calf is to be sold.
      a. If cows produce regularly (every 12th month) there should be a calf to sell every year.
      b. Calves should reach desirable market weights (400 - 600 pounds) in six to eight months.
      c. The most desirable cow-calf situation is to have all calves ready for market at or near the natural pasture-production period. Some calves may need a small amount of additional feed to reach desirable weights at this time.
      d. If calves are not born to reach desirable weights by this time, additional feed will be needed to keep calves in a gaining condition.

IV. Health Costs.

A. The old saying, "An ounce of prevention is worth a pound of cure," is the best and cheapest way to approach health problems in any type of livestock.

B. Major costs include:

1. Parasite control. This is extremely important even for young nursing calves, especially when they are maintained on permanent pastures.
   a. Dr. Newell Hicks expresses this situation very clearly in the statement he uses on the 4P's of parasites, "Permanent Pastures Perpetuate Parasites."
   b. There are several parasite control measures that can be effective. Check the latest parasite recommendation from the Kentucky Agricultural Experiment Station for the most desirable product to use.
2. Vaccination protection. A vaccination program for the herd should be designed according to:
   a. The past health history of cattle on the farm.
   b. The present health situation of the cattle on the farms that border the farm you are using.
   c. The present health situation of the livestock throughout your local community area.
3. Growth stimulants. When proper selected and managed, growth stimulants can be profitable to beef producers.
   a. Any growth stimulant should be thoroughly researched by the producer before it is used to see that the desired results will be obtained, the possible side-effect reactions will be understood and manageable and that they will not affect the sale of calves at the desired time.
   b. For many years feedlots have used growth stimulant injections and improved gains and profits; now the cow and calf producer can also capitalize on the same thing.
   c. Growth stimulants are especially useful on calves that are born late and need a boost to catch up, likewise the early-born calves may also put on a few extra pounds and make heavier weights at weaning time.
   d. Two of the new stimulants that have recently been cleared for use are Ral-Gro* and Syno-Vex*.
   e. Consider all the characteristics of a growth stimulant; do not let one factor lead you into using a stimulant that might cause you more problems later.

Suggestions for Teaching the Lesson

I. Developing the Situation

A. Things to be brought out by the teacher:
   1. Experiment Station/Extension data on costs
   2. Examples of good cost control
   3. Recommended practices in cost management

*Trade names - no endorsement is intended.

B. Things to be brought out by the class members:
   1. Their costs in producing a calf
   2. Considerations in calculating costs
   3. Individual costs of inputs

II. Conclusions

A. A farmer should purchase a cow that will pay for herself by providing two offspring to sell or one offspring and her market salvage value.

B. A sire should be selected for a certain purpose and should not cost more than the increased value of this purpose over a three-year period.

C. Maintenance costs should be managed to get the job done and stay as low as is practically possible. All costs that the beef enterpriser is responsible for should be calculated.

D. Feed costs per calf should be related to the productive ability of the present animals as much as possible. Supplemental feeding should only be used when an economic profit or a healthier condition can be realized. This is assuming that stronger healthier animals will have a greater profit potential.

E. Health costs in calf production include parasite control, vaccination programs, and growth stimulants. All other costs should be aimed toward improved production and increased profits.

III. Enrichment Activities

A. Secure speaker on economics of cow-calf operation.

B. Attend Beef Cattle Field Day at University of Kentucky.

IV. Suggested Teaching Materials

A. References
   1. Beef Cow Herds, p. 40.
   2. NRC Feed Requirements.
   3. Parasite Recommendations for Beef Cattle.
   4. Control of Beef Animal Insects, UK ENT.-11.
   5. Approved Practices in Feeds and Feeding, Cassard and Juergenson, ch. 5, 7.
   6. Beef Cattle Science, Ensminger, ch. 9.

B. Audio-visuals
   1. Masters
      -1 Sire Cost
      -2 Maintenance Cost Worksheet for Spring-Calving Cow
      -3 Added Cost for Fall-Calving Cow

MAINTENANCE COSTS FOR SPRING-CALVING COWS

Feed Costs		Expected	Actual
2 ton hay @ $35/ton		$ 70.00	
3 ton pasture @ $10/ton		30.00	
5 bu. corn @ $2/bu.		10.00	
	Total Feed Costs	$110.00	
Other Costs			
Power and Fuel		3.00	
Vet and Drugs		3.00	
Marketing		5.00	
	Total	$11.00	
Overhead Costs			
Depreciation and Repair		2.50	
Interest			
Building and Equipment		2.00	
Livestock (depreciation cost)		17.50	
Taxes, Insurance and Breeding		9.00	
		$31.00	
Labor (12 hours)		24.00	
		$176.00	
500-pound Calf at 45¢ =		225.00	
	Profit	$ 49.00	

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ADDED COSTS FOR FALL-CALVING COWS

Feed Cost

5 bu. of corn @ $2/bu.	$10.00
150 pounds Supplement @ $8/cwt.	12.00
Additional Feed Cost	22.00

Other Costs

Power and Fuel	$4.00
Vet and Drugs	4.00
Marketing	5.00
	$13.00

Overhead Costs

Depreciation and Repair	$4.00
Interest	
Building and Equipment	4.00
Livestock	17.50
Taxes, Insurance and Breeding	9.00
	34.50

Total Costs	$203.50

Lesson 3

IMPROVING THE BIRTH RATE IN THE BEEF HERD

Objective -- To develop the effective ability of farmers to increase the calf crop from the beef herd.

Problem and Analysis -- How can we increase the percentage of cows calving in our beef herd?

-Condition of cows at breeding
-Condition of bulls at breeding
-Nutrient requirements
-Size of cows
-Signs of parturition
-Handling the newborn calf

Content

I. Condition of Cows at Breeding.

A. A properly managed nutrition program will pay large dividends in terms of higher conception rates in properly conditioned cows.

B. The cow should be in a thrifty condition.
1. Excess fat may interfere with a good conception rate.
2. Extremely thin females are slow to conceive in early heat periods following calving. (This point is developed further in lesson five.)
3. Females should be in a gaining condition.

C. Dry, pregnant cows will consume about 2.0 - 2.2% of live weight in total feed intake daily.

D. Freedom from disease will greatly improve conception. Females with venereal problems should be removed from the herd.

II. Condition of the Bull at Breeding.

A. Thrifty fleshing and a gaining condition will be well worth the feed required. Extremely thin bulls may not settle cows.

B. Excessively fat bulls may be slow to start breeding and may never sufficiently handle a large number of cows.

C. Good beef managers will have bulls fertility-tested before turning them out to breed.

D. Bulls should be in hard, thrifty range condition for effective pasture breeding.

E. Young bulls may need some supplemental feeding during their first breeding season to maintain strong healthy condition. Young growing bulls will consume 2.5 - 3.0% of life weight in total feed intake daily.

F. Older bulls serving large numbers of cows may also benefit from supplemental feeding.

G. The bull-to-cow ratio may have a big effect on the percent of cows that are conceived.
   1. Young bulls, 15-18 months old, can be depended on to breed 10-15 cows.
   2. Older bulls can handle up to 40 cows under average pasture breeding conditions, but with added feeding and management older bulls can effectively handle more than 40 cows.

III. Nutrition Requirements. Good nutrition and high conception rates are directly related. The amount of digestible nutrient "intake" is very important for good conception. It is noteworthy that experimental results to date fail to show that the fertility of the germ cells is seriously impaired by uncommonly high or low feed and nutrient intake. In contrast to these findings, it is equally clear that the onset of heat and ovulation in young heifers is definitely and positively correlated, with the level of nutrient intake; thus if feed or nutrient intake is too low for normal rates of growth and development, the onset of reproductive function is delayed. This point will receive additional attention in a later problem.

IV. Size of Cows.

A. This is extremely important from the standpoint of cross breeding, especially when bulls from the "exotic" breeds are used, e.g., Charolais, Simmental, Maine - Anjou, Limousin or Chianina. Cows must have the structural frame and capacity in the area of the rump and reproductive organs to deliver a live calf. This is true regardless of the breed or combination of breed from which they descend.

B. Natural, unassisted births are the most desirable for cow, calf, and producer. It helps cut vet costs and possible loss of a cow or her functional ability to breed, produce, and rebreed in a desirable length of time.

V. Signs of Parturition.

A. Knowing these signs well may help when and if assistance is needed:

1. Swollen vulva.
2. Distended udder. Dripping of milk from heavy milk producers.
3. Nervousness.
4. Abandoning the rest of the herd.
5. Sinking of areas around pin bones and tail head.
6. Appearance of water bag or other discharges from vulva.
7. After six hours of hard labor with no satisfactory results, get assistance from a veterinarian.

B. Presentation positions. (See Masters -1 A-F)

1. Normal position should take care of itself, if calf is normal size.
2. If not promptly delivered, reverse position may prove fatal, due to suffocation.
3. Problem positions need knowledgeable assistance for good success. The help of a veterinarian is highly recommended.

VI. Handling the New-Born Calf.

A. Provide good clean pasture for cows right before calving, if outdoor calving is practical.

B. Disinfecting navel cords with 7% full strength iodine will help curb early infections.

C. Check to make sure nostrils and throat are clear and functioning properly. A straw used to tickle the nostril will cause calf to blow any foreign material out of the nose by himself.

D. Check to make sure calf is nursing and cow is milking properly. Give assistance if calf hasn't nursed after first hour of life.

E. A shot of Vit A1, D, and E will help strengthen weak calves and build stronger resistance. Check the bottle for proper dosage.

F. Make sure cattle have a dry, well-drained area to lie in during damp weather.

G. If cattle are allowed to use barns, make sure the loafing area is thoroughly disinfected after each cleaning.

H. The first 36 hours is the most critical period in the life of a young calf.

Suggestions for Teaching the Lesson

I. Developing the Situation.

A. Things to be brought out by the teacher:
1. How many figure their percentage of live calves born?
2. What makes some percentages higher than others?
3. The most critical period of time for a new-born calf.

B. Things to be brought out by class members:
1. Their calving percentage last year.
2. What did they do to produce this percentage?
3. What management practices do you use on new-born calves?

II. Conclusions.

A. Keep all cows in good thrifty condition and provide proper intake of needed nutrients. Remove all diseased animals from breeding herd as soon as detected. Test and vaccinate annually to maintain a clean breeding herd.

B. Keep the bull in good, strong, hard-breeding condition. To insure a high conception rate, keep the cows-to-bull ratio at a realistic rate.

C. Provide a balanced intake of the needed feed nutrients during gestation.

D. In a sensible, realistic manner, select the kind of cows to do the job you want them to do.

E. Make sure the cows are capable of calving easily with the bulls you plan to use (or select a bull that will bring about the greatest growth and profit from the cows you already have and plan to use).

F. Be aware of the signs of parturition and know what to do to get the most live calves on the ground. Then give the calves a chance by providing an environment conducive to good growth and a healthy life.

III. Enrichment Activities.

A. Tour members' beef herd.

B. Invite a veterinarian in to discuss calving difficulties (dystocia).

IV. Suggested Teaching Materials.

A. References for Lesson 1
1. Beef Production, Ensminger, pp. 201-223, 225, 278.
2. Animal Science, Ensminger, pp. 458-466.
3. Beef Cattle Science, Ensminger, ch. 6.

B. Audio-visuals

1. Masters

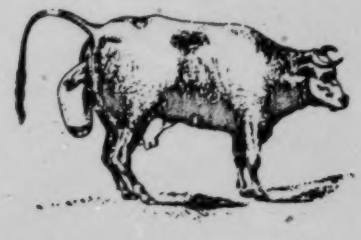
-1 A-F Presentation positions (See pp. 218-220, Beef Cattle Science)

-2 The First 36 Hours

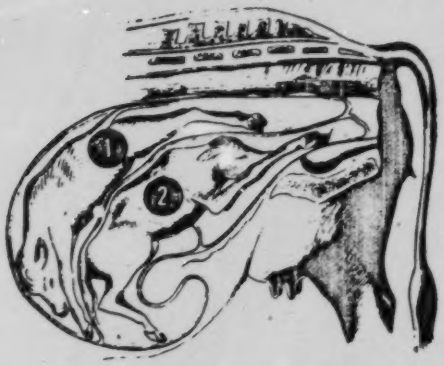
-3 Handling the Newborn Calf

PRESENTATION POSITIONS

A. Foetal Membranes of the Cow at Mid-Term–Uterus Open on its Left Side.

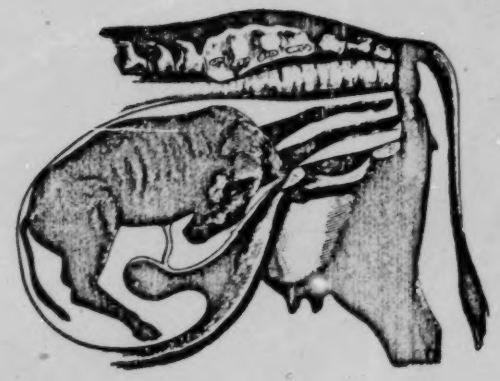


B. Beginning of the Act of Parturition.



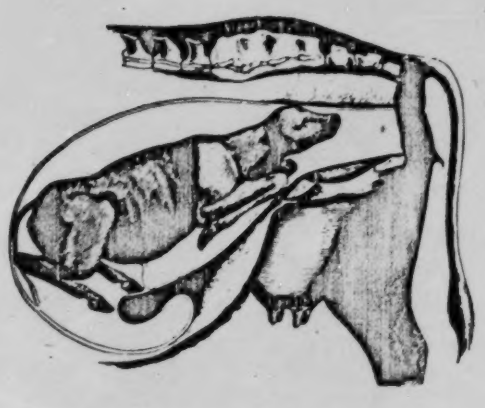
C. Foetuses Nos. 1 & 2-Normal Position, Twin Pregnancy.

Foetus No. 2-Normal Position, Single Pregnancy.



D. Anterior Presentation: Lateral Deviation of the Head Towards the Abdomen (Abnormal Position).

E. Posterior Position of the Foetus (Abnormal Position).



F. Fore-Limbs Flexed at the Knees, in the Anterior Presentation. (Abnormal).

Source: Basic Principles of Animal Science, Miss. State Univ., p. 12.

CALF MORTALITY

THE FIRST 36 HOURS*

The Problem - 7% of calves perish during this period
2% to 9% on different farms

Causes - "unknown"
scours and other diseases
drowning
killed by dogs and other animals

Contributing Factors - Poor mothers
Mothers not bred previous year
Young mothers
Poor nutrition level of mother

Care - Alertness
Selection
Pregnancy checks
Proper feeding
Management

*From a four year survey of the southeastern United States.

Source: R. S. Temple, USDA.

HANDLING THE NEWBORN CALF

1. Provide clean pasture for calving.
2. Disenfect navel with 7% iodine.
3. Clear nostrils and throat
4. Make sure calf is nursing.
5. Give vitamin A_1, D and E shots to weak calves.
6. Provide dry bedding site for wet weather.
7. Watch new calf for first 36 hours.

Lesson 4

RAISING CALVES TO WEANING

Objective -- To develop the effective ability of farmers to wean heavier beef calves.

Problem and Analysis -- How can we increase weaning weight of our beef calves?

-Factors affecting weaning weight
-Management practices needed

Content

I. Factors Affecting Weaning Weight

A. Type of dam
1. The cow's feed requirements are discussed in a later lesson.
2. The advantage in calves produced from crossbreds over straightbreds is:*
   a. Calving 4.7%
   b. Calf Crop Weaned 4.8%
   c. Calf Weaning Weight 5.0%

B. Growth potential of the sire
1. Selection of a sire is exceedingly important.
2. The herd sire has half of the influence on every offspring he sires. For example: In a herd of 25 cows, the sire has 25 times as much influence as any single cow.
3. The growth potential available to the beef producer today is greater than it has ever been. There are excellent growth-producing sires available to use in any type of beef production program.
4. Hybrid vigor from crossbreeding can also influence growth potential.
5. Some breeds can be used as a maternal breed.
   a. Here the daughters can be kept to use as improved replacement females.
   b. Breeds, to date, that have proven this ability include: Angus, Simmental, Hereford, and Shorthorn.
6. Some breeds can give best results when used as a terminal breed, where all of the offspring are sold. These breeds appear to include Chianina and Charolais.

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*Advantage of crossbred over straightbred cows when both produce a crossbred calf. Comparisons were between Angus, Hereford, and Shorthorn straightbreds and all possible two-breed crosses of these breeds.

C. Requirements of the beef calf

1. According to the National Research Council's Nutrient Requirements, a 300# steer or heifer requires 5.6# of dry matter per day. This should contain at least .22# of digestible protein and 3.1# of Total Digestible Nutrients for maintenance alone. When a gain of about 1.5#/day is expected, the dry matter must increase to a range of 5.9-6.0# with .60-.61# of digestible protein and 4.9-5.1# of T.D.N.
2. To satisfy these requirements and get these calves to larger weights we have two alternatives. Assuming these calves will be nursing until they are 500# or heavier, we can either let them graze with no creep and only the mother's milk or give them some additional nutrients through supplemental or creep feeding. The cost of feed/pound of gain will determine whether this is economical or not.

D. The effect of pasture on calves

1. The quality and quantity of pasture available determine the effect it will have on the growth of calves.
2. Let us compare a grass pasture, a grass-legume pasture, and a legume pasture that have been under test at the University of Kentucky for a three-year period. Test groups were split into two groups, with one-half of each group calving in the spring and the other half calving in the fall. The seasonal comparison will be made later. See Table 1.

Table 1. Effect of Pasture on Calves, No Creep Feeding

Pasture	Weight of Weaned Spring-Calves	Age in Days
Bluegrass and Clover	485#	207
Fescue and Clover	413#	199
	Difference 72#	

E. Effect of creep feeding

1. The same test compared creep feeding to pasture alone. See Table 2.

Table 2. Effect of Pasture on Calves, With Creep*

	Weight of Weaned Spring-Calves	Creep Feed (# feed/head daily)	Age in Days
Bluegrass and Clover	511#	3.21#	203
Fescue and Clover	479#	2.82#	197
Difference	32#		

*Calves were fed 172 days the first year, 166 days the second year, and 169 days the third year.

F. Difference in seasonal effect on weaning weights
   1. The same test used in points D and E can be used to illustrate point F.
   2. The feed costs for wintering the fall-calving cows, in general, have been almost twice as much as that for spring-calving cows. This greatly affects the profits from fall-calving cows.

Table 3. Seasonal Effect on Weaning Weights.

	Spring Born	Fall Born
Weaning Weight	485	517
Age in Days	207	268
Weight/Days of Age	2.34	1.93

Table 4. Feed Requirements for Fall and Spring Calving Cows

	Spring-Calving	Fall-Calving
No. Days Fed Hay	127	113
No. Days Fed Corn	69	44
No. Days Fed Silage	-	132
Lb. Hay/Day	10.97	5.12
Total lb. Hay Fed/Cow	1397	5.75
Lb. Corn/Day	3.12	3.20
Total lb. Corn Fed/Cow	214.5	144
Lb. Silage/Day	-	38
Total lb. Silage Fed/Cow	-	5040

II. Management Practices Needed

A. Higher weaning weights can be expected by using crossbred cows in a commercial beef-production enterprise. Two-breed-cross cows are superior to straightbred cows, and three-breed crosses show superiority over the two-breed crosses.

B. Sire selection will depend on the ultimate destination and use we intend to make of the offspring; 365-day weights are the most desirable tool to use at the present time for improved sire selection. Structural soundness, functional ability, and desirable conformation should always be used to complement sire selection.

C. Without the knowledge of nutrient requirements needed by calves to achieve the goal (e.g., 500# at 205 days), and resultant satisfactory feeding, a profit in the operation cannot be made.

D. Creep-feeding has resulted in slightly higher A.D.G. figures and higher weaning weights; however, this is a rather narrow margin a careful study of cost of feed/# of gain should be made before creep-feeding is used.

E. Spring calves have a definite advantage over fall calves. They are born and mature during the grazing season and can be grown on more economical feed than fall calves. Fall calves require some stored feed, which is higher than grazing forages. The fall calves may need to be handled for a longer period of time in order to reach desirable market weights. Maintenance costs are higher on fall calving cows and calves, which lower the profit margin as compared to spring calving cows.

F. All male calves should be castrated at an early age to prevent stress and weight losses. Dehorning should likewise be done at an early age and by a bloodless means. Vaccinations should be spread out so as to reduce stress.

G. Growth hormone injections will improve gains while the calf is nursing.

H. A regular parasite prevention program should be carried out. "Permanent Pastures Perpetuate Parasites" - so rotate pastures!

Suggestions for Teaching the Lesson

I. Developing the Situation

A. Things to be brought out by the teacher:
1. Percentage of local feeder cattle sold at weaning age.

2. Higher weaning weights mean higher gross income and a chance for a wider profit margin.
3. Weaning weights can be increased by improved selection and management.

B. Things to be brought out by class members:
1. Their average weaning weight, compared with last year's average.
2. Possible causes for the difference.
3. Other things which have influenced weaning weights of their calves.

II. Conclusions

A. Farmers should bring the following factors to bear on raising weaning-weight potential: quality of the dam, growth potential of sire, feed requirements of the calf for maintenance and growth, creep-feeding potential, and the seasonal effect on calving.

B. Management practices which should be used to raise weaning weight are: use of crossbreeding, using tested sires, creep-feeding, spring calving, early castrations and dehorning, proper vaccinations and parasite control.

III. Enrichment Activities

A. Visit a quality beef cow-calf operation.

B. Provide portable scale for weighing calves.

C. Assist members with weaning records.

IV. Suggested Teaching Materials

A. References
1. Proceedings, 1972 Beef Cattle Day, UK.
2. Nutrient Requirements of Beef Cattle, ASC-9.
3. Livestock and Poultry Production, pp. 233-236.
4. Beef Cattle Science, Ensminger, ch. 9.

B. Audio-visuals
1. Masters
-1 Productivity per cow unit
-2 Feed Requirement for Calving
-3A Effect of Pasture on Calves, No Creep
B Effect of Pasture on Calves, With Creep
-4 Seasonal Effect on Weaning Weights

Productivity Per Cow Unit*

	STRAIGHT-BRED COW	
	Straight-bred--Crossbred	
	Calf	Calf
% Calf Crop Weaned	82	85.5
205 Day Weight (in #)	420	440
# Calves Weaned/Cow	344	376
% Increase Over Straight-bred	-	9

* Assuming all straight-breds and crossbreds involve Angus, Hereford or S
breeds. No exotics were used. The numbers in these columns are estir
average productivity for each combination of breeding in Kentucky at pres

Productivity Per Cow Unit*

	STRAIGHT-BRED COW Straight-bred--Crossbred Calf	Calf	CROSSBRED COW Crossbred Calf
Weaned	82	85.5	89.6
ht (in #)	420	440	462
ned/Cow	344	376	414
ver Straight-bred	-	9	20

ll straight-breds and crossbreds involve Angus, Hereford or Shorthorn
o exotics were used. The numbers in these columns are estimates of
oductivity for each combination of breeding in Kentucky at present.

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FEED REQUIREMENTS FOR FALL AND SPRING-CALVING COWS

	Spring-Calving	Fall-Calving
No. Days Fed Hay	127	113
No. Days Fed Corn	69	44
No. Days Fed Silage	-	132
Lbs. Hay/Day	10.97	5.12
Total Lb Hay Fed/Cow	1397	5.75
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EFFECT OF PASTURE ON CALVES, NO CREEP FEEDING

Pasture	Weight of Weaned Spring-Calves	Age in Days
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Difference	72#	

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Fescue and Clover	479#	2.82#	197
Difference	32#		

*For this test, calves were fed 172 days the first year, 166 days the second year, and 169 days the third year. Figures are three year average.

SEASONAL EFFECT ON WEANING WEIGHTS

	Spring Born	Fall Born
Weaning Weight	485	517
Age in Days	207	268
Weight/Days of Age	2.34	1.93

Lesson 5

FEEDING BEEF COWS

Objective -- To develop the effective ability of farmers to recognize and make the most efficient use of the feed requirements of the beef cow.

Problem and Analysis -- How can we manage the feeding of the beef cow herd for highest production?

-Nutrients required by beef cows
-Influence of cow size on nutrient requirements
-Influence of pregnancy on nutrient requirements
-Requirements for straight-bred beef cows vs. cross-bred beef or beef-dairy-cross cows
-Seasonal effect on nutrient requirements

Content

I. Nutrients Required by Beef Cows

A. Protein is of major importance, since it constitutes the greatest part of the body-cell make-up and is directly involved with the major objectives in beef production, which are growth and reproduction.
1. Young cattle need protein for growth.
2. Mature cattle need protein for maintenance and reproduction.

B. Energy is furnished through carbohydrates and fats.
1. Beef-cattle consume small amounts of fat even though fat provides $2\frac{1}{4}$ times as much energy as carbohydrates.
2. Carbohydrates account for about three-fourths of the dry matter in most forages and grains.
3. Energy is necessary for rumination and the digestive processes, maintenance, and fattening.

C. Minerals are needed for general well-being and proper skeletal growth and development.
1. Beef cattle requirements for minerals are not as high as for most other farm animals.
2. Calcium and phosphorus are very important, since they make up about 75 percent of the minerals found in the body. About 90 percent of that amount is found in the skeleton.
3. Bonemeal is a good source of Calcium and Phosphorus and is most effective when fed free-choice.

4. Salt is a good supply of sodium and chlorine but is usually deficient in most rations.
5. A trace-mineral mixture may also prove to be good insurance, especially in areas where there are mineral deficiencies in the soils.

D. Vitamins are essential for growth, maintenance, and reproduction. Vitamin A is of major concern, since it does not occur as such in plants.
   1. Beef cattle can synthesize vitamin A from carotene, which is found in green plants and yellow corn.
   2. Beef cattle can store vitamin A during peak grazing seasons for use during the long feeding periods of winter.
   3. Proper vitamin A levels are exceedingly important for efficient breeding and rebreeding of the brood cow.

E. Water is the most essential nutrient. Neither the body nor any of the other nutrients would be effective without water.
   1. Mature cattle may consume an average of 12-15 gallons of water per day.
   2. Water intake is affected by age of cattle, climate, season of the year, type of feeding program, and ration that the cattle are consuming.

II. Influence of Cow Size on Nutrient Requirements.

A. Mature beef cows are fed for three major reasons, production, reproduction, and maintenance.

B. The gains of a mature cow should be affected only by the state of her reproductive cycle.

C. She should be in a gaining condition, which is about 1 to 1½ pounds per day, from the time her calf is weaned until she drops her next calf and is rebred. From this point, she should tend to lose weight slowly until the calf is weaned. This weight loss is due to the increase in milk production demanded by the growing calf.

D. Dry matter content of feeds determines the total intake ability or capacity of the cow.

E. A small cow (900#) does not have the capacity or the need for as much feed as a large cow (1400#).

F. In the following example, the dry matter intake of a 900# cow is 14.3#/day, according the the National Research Council (NRC) standards, the most up-to-date standards available at this time. (See UK Bulletin ASC-9 for further information.) The dry-matter intake of a 1400# cow is 19.9#, a difference of 5.6#. Assuming a winter-feeding ration is about 90 percent roughage, and a winter-feed period lasts from 90-120 days (range from northern Kentucky to southern Kentucky) for an average

of 105 days, this would mean that a large cow would require about 588 pounds more roughage than a smaller cow. Four large cows (1400#) would consume over one ton more roughage than four small (900#) cows.

DAILY NUTRIENT REQUIREMENTS

	Dry Matter	Digestible Protein	TDN
1400# Cow	19.9#	.56#	9.9#
900# Cow	14.3#	.40#	7.1#
Difference	5.6#	.16#	2.8#

III. Requirements of the Dry, Pregnant Cow vs. the Nursing, Producing Cow.

A. Cows need much higher levels of all nutrients when in production.

B. Assuming all genetic, health, and conditioning factors as normal, we can assume the way a producing cow is fed will directly affect her production.

C. A cow's producing ability affects her income potential, and no one wants to put a ceiling on income.

D. For example, let us compare the requirements of a dry pregnant 1000# cow to a nursing 1000# cow in full production:

REQUIREMENTS OF THE BEEF COW

Condition of 1000# Cow	Requirements DM	DP	TDN
Nursing	21.9	1.18	12.4
Dry, Pregnant	15.1	.42	7.6
	6.8	.76	4.8
	45%	180%	63%

A nursing cow needs 45 percent more dry matter, 180 percent more protein (due to the quantity of protein in milk) and 63 percent more TDN. All of these increases are due to the body producing more things (maintenance needs, growth needs, reproduction needs, and needs for increasing milk production). These things must also be produced faster because the requirements for the living, growing calf are much higher and in much greater demand than for the developing fetus.

E. A dry, pregnant cow must maintain herself and a growing fetus for nine months. A nursing cow must produce enough for her-

self and her calf (two individuals) for about 60 days after the birth of the calf. Then, assuming she is bred within 60 days, she must meet the needs of three individuals (herself, her growing calf, and the fetus) for 150 to 180 more days until the calf is weaned (at about 7-8 months). Then she will need to meet the requirements for herself and her growing fetus, which will increase by about 40#, for the next 103-133 days, depending on when she weans her nursing calf. Considering this, we can assume that a good producing cow will always have the nutrient requirements for at least two animals.

IV. Requirements for the Beef-Dairy Cross.

A. The beef-dairy cross cow is very popular among commercial beef producers.

B. She is an excellent mother, due to her one-half dairy parentage, which allows greater milk production and the ability to wean a heavier calf.
   1. This is due to the extra milk and to the hybrid effect of cross breeding.
   2. This ability to produce more milk has an important effect on her nutrient requirements.

C. Let us look at the requirements of the dairy cow and the beef cow and assume the cross between the two will bring about requirements close to the average of the two extremes.
   1. Example:

	DM	DP	TDN
1000# dairy cow	30.0	2.43	20.3
1000# beef cow	21.9	1.18	12.4

   2. Pennsylvania tests show that for a 240-day (eight month) milking period the following milk production was measured: straight-bred Angus cow, 3000# for 240 days; Angus-Holstein Cross cows, 5000# for 240 days.
   3. On a daily basis, tests show that two year old Angus heifers will average 8.75# and Angus-Holstein cross heifers averaged 12.51 # of milk.

V. Seasonal Effect on Requirements.

A. The following are some tips on feeding cows in the winter:
   1. The winter-feeding period in Kentucky usually lasts about 90 to 120 days, depending on what part of the state you are located in. Farmers must plant for adequate forage.
   2. Feed is expensive to buy, raise, and store. The best possible management is needed when planning a winter feeding program. The farmer should feed enough but not overfeed; cattle should be fed according to how hard they are working (or performing).
      a. Dry cows, older replacements, and stocker cattle can get along on lower quality hay (grass hay or hay with a low percentage of legume content).

b. Before calving, dry cows need 2# of hay per 100# of body weight or 3-5# of silage per 100# of body weight daily.
c. Producing (nursing) cows, and young growing (weanling) cattle need the best quality feed available.
d. After calving, increase the feed for nursing cows by 40 percent. If the legume content of the hay is 40 percent or less, supplement the hay with 1# to 1½# of protein, according to forage quality. If grain is available, remember: 1# of ground ear-corn will replace 3# of grass hay. One pound of hay is equivalent to 3# of silage. Each cow should receive 40-60# of silage and 1# of protein supplement.
e. Keep salt, calcium and phosphorus available, free choice, for all cattle. Home-grown feeds are a good source of minerals. Don't spend money on trace minerals unless there is a known deficiency in your area, and then only purchase the minerals needed. Adding magnesium to the mixture should help control grass (or "winter") tetany.
f. Mature cattle need some vitamin A available during winter. Vitamin A can be fed in a mixture with salt. A cow should receive 30,000 units per head per day. Do not purchase other vitamins or premixes unless you have the symptoms of, or know of a possible deficiency in your herd. Vitamins are expensive, and in most cases vitamin A is the only one that really needs to be supplemented.
g. Make sure a clean, adequate supply of water is available every day.

3. A sudden drop in temperature in winter requires increased demand of an animal's body to produce enough heat to keep warm.
   a. A sudden drop would be 10 or more degrees in 24 hours or less.
   b. These drops are not a great problem unless the temperature drops below freezing (e.g., 40° dropping to 30°).
   c. Additional feeding at this time will help control winter tetany. This is a problem in large, heavy cows with higher requirements, and producing cows who also have high daily nutrient requirements.
4. Do not stop winter feeding completely until spring grass has stabilized itself and passed the "washy" stage. This will also help reduce winter and/or grass tetany problems.

Suggestions for Teaching the Lesson

I. Developing the Situation

A. Things to be brought out by the teacher:
1. The most economical way to determine how much to feed beef cows is to use their nutrient requirements as a guideline.
2. The nutrient requirements of beef cows.
3. Where to find the feed requirements of beef cows.
4. How to interpret feed standards and requirements.

B. Things to be brought out by class members:
1. How class members determine what to feed beef cows.
2. Indications of adequate rations.
3. The most economical ration to be feeding.

II. Conclusions

A. Beef cattle require all five of the basic feed nutrients for top performance, growth, and economic gain. These nutrients are protein, energy, minerals, vitamins, and water. Farmers should supply the five required nutrients through a balanced ration.

B. Cow size is directly related to nutrient requirements. Beef producers should give larger cows more feed than small cows. The two major uses cows make of nutrients they consume is for maintenance (which relates closest to differences in sizes) and reproduction.

C. Provide nursing (or producing) cows with more nutrients than dry cows. Proper feeding of the producing cow will improve her ability to milk and raise a heavier calf.

D. The beef-dairy cross should be given more feed nutrients than the straight-bred cows, due to their added milk production.

E. Anticipate increased needs in cold weather by heavier feeding. The season of the year also affects the beef cows' nutrient requirements. This is most important in the winter time when there is very little grazing available and the cow's diet must be supplemented with stored feeds.

III. Enrichment Activities

A. Attend a beef winter-feeding demonstration.

B. Test home-grown feed for nutrient value.

C. Secure and distribute copies of the NAS publication, Nutrient Requirements of Beef Cattle.

IV. Suggested Teaching Materials

A. References

1. Beef Production, chapter VIII.
2. Beef Cattle, Industry Facts, UK Ag Series 9.
3. Nutrient Requirements of Beef Cattle, NAS.
4. Ky. publications, ASC-8, -9, -10, -12, -16.
5. Beef Cattle Science, Ensminger, ch. 8.
6. Approved Practices in Feeds and Feeding, chs. 5 and 7, 3rd edition.

B. Audio-visuals

1. Masters
   - -1 Nutrient Requirements of the Beef Cow
   - -2 Daily Requirements for Maintenance and Lactation
   - -3 Annual TDN Requirements for Cow and Calf
   - -4 Composition of 100-Unit Cow Herd
   - -5 TDN Needs of Beef Cow-Calf Unit by Periods
   - -6 Cow-Calf Days Available from Different Feeds
   - -7 Acres needed for 100 Cows and Calves

DAILY NUTRIENT REQUIREMENTS

	Dry Matter	Digestible Protein	TDN
1400# Cow	19.9#	.56#	9.9#
900# Cow	14.3#	.40#	7.1#
Difference	5.6#	.16#	2.8#

DAILY REQUIREMENTS OF BEEF COWS FOR MAINTENANCE AND LACTATION

Cow Size (lbs.)	Maintenance		10 lbs. Milk		20 lbs. Milk	
	CP	TDN	CP	TDN	CP	TDN
1,000	.88	7.5	1.7	10.2	2.4	13.4
1,200	1.03	8.8	1.9	11.1	2.6	14.2

SOURCE: Beef Cattle Industry Facts, University of Ky.

106-5-2

ANNUAL TDN REQUIREMENT OF BEEF COW AND CALF

	Pounds
Cow--wintering (125 days)	1,000
lactation (240 days)	3,220
Total	4,220
Calf	925
Total (cow and 575 lb. calf)	5,145

SOURCE: Beef Cattle Industry Facts, University of Ky.

COMPOSITION OF 100-UNIT COW HERD (SPRING CALVING)

	J	F	M	A	M	J	J	A	S	O	N	D
Cows	85	85	85	100	100	100	100	100	100	100	85	85
Calves	18	18	18	90	90	90	90	90	90	90	18	18
Yearlings	-	-	-	18	18	18	-	-	-	-	-	-
Bred Heifers	15	15	15	-	-	-	15	15	15	15	15	15
Bulls	4	4	4	4	4	4	4	4	4	4	4	4

Average Annual Cow-Calf Unit Composition

.9375 cow
.6 calf
.045 yearling
.113 bred heifer
.04 bull

SOURCE: Beef Cattle Industry Facts, University of Ky.

106-5-4

TDN NEEDS OF BEEF COW-CALF
UNIT BY PERIODS

Period	Months	Days	Av. Daily TDN Needs Cow	Calf	Total TDN Needs Pounds
I	Apr. May Jun.	91	15	-	1,365
II	Jul. Aug. Sept.	92	13	6	1,750
III	Oct. Nov.	60	11	6	1,037
IV	Dec. Jan. Feb. March	121	8	-	968
					5,120

SOURCE: Beef Cattle Industry Facts, University of Ky.

COW-CALF DAYS AVAILABLE FROM DIFFERENT FEED SOURCES

Source	Lbs. TDN Eventually fed per acre	Cow-Calf Days [1] (Per Acre) I	II	III	IV
		(Per Period)			
Alfalfa-grass silage	3,260	217	172	192	408
Corn silage	6,660	444	350	392	832
Alfalfa hay	4,360	291	229	256	545
Ear corn	4,550	303	239	268	569
Oat silage	3,100	207	163	182	388
Forage sorghum silage	5,702	380	300	335	713
Shelled corn	3,987	266	210	234	498

[1] Value applies if all feed is fed in one period.

SOURCE: Beef Cattle Industry Facts, University of Ky.

ACRES NEEDED FOR 100 COWS AND CALVES PLUS
FROM DIFFERENT SOURCES

Source	Lbs. TDN Eventually Fed Per Acre[1]	Acres Needed [2]
Legume-grass silage	3,260	181
Corn silage	6,660	88
Alfalfa hay	4,360	135
Ear corn	4,550	129
Oat silage	3,100	190
Forage-sorghum silage	5,702	103
Shelled corn	3,987	148

[1] Values are taken from Silage Production and Use, I.S.U. Ext. PM 417, 1968.

[2] See Table 6, total need per cow-calf unit is 5,120 plus 15 percent, or 5,880.

SOURCE: Beef Cattle Industry Facts, University of Ky.

Lesson 6

PRODUCING REPLACEMENT HEIFERS

Objective -- To develop the effective ability of farmers to produce replacement heifers.

Problem and Analysis -- How can we produce quality replacement heifers?

-Importance
-Selection factors
-Nutritional requirements
-Breeding
-Calving heifers

Content

I. Importance

A. The selection and production of replacement heifers is one of the soundest and most economical ways to perpetuate, improve, and expand the producing beef herd.

B. One-third of the heifers kept for replacements will normally be used to replace cull cows. If a herd is to be expanded a larger percentage must be kept.

II. Selection Factors

A. Size is very important in beef cattle today, and in the future it will be even more important.
1. The largest, growthiest heifers should be kept for replacements. These heifers will usually have good producing dams.
2. Two or three factors may be used to help determine size.
a. Two hundred and five day weights can be very helpful in commercial as well as purebred operations.
b. Yearling weights - this will help make further culling more effective.
c. Weighing at breeding age will help determine the heifers which will continue to grow and mature at larger sizes and weights.

B. Conformation and Soundness
1. It is important for cattle to be big, but in order to remain in production they need to have the right kind of muscling in a desirable shape that is strongly attached to a sound frame (bone structure).

2. Structural soundness is directly related to longevity of production.

C. Ancestry. This is usually available on all heifers that are dropped and heifers raised on the home farm.
1. It may range from one generation to many generations.
2. All heifers dropped on the farm have at least a dam, and possibly a sire (one gestation) to which to refer.
3. The number of previous generations that have records will vary according to the availability of records and pedigrees (in the case of registered herds).

III. Nutrition Requirements

A. Nutrition in replacement heifers is extremely important. It is important in terms of conditioning at breeding age and it is also economically important in terms of input costs to the producer.

B. Heifers will reach sexual puberty at 14 to 16 months of age; at this time they should weigh 650-700 pounds or more, and be in good thrifty condition.
1. If this is not possible, then the heifer should not be bred, or she will be too small at maturity.
2. Heifers should not be fat at 650-700 pounds; they should be in a thrifty growing condition.
3. Heifers should never be allowed to get fat. Fat heifers are more prone to have calving problems and become low milk producers, due to undesirable fat buildup in the udder during growth.
4. Heifers should be weaned in the fall and wintered to gain 1.0 to 1.5 pounds per day during the winter months.
a. Example. Weaned heifer 450 pounds in mid November. Wintered 135 days at 1.25 lb./day will weigh 619 lb. about early April. Graze on pasture until breeding in June.

Pasture gain at 1.5 lb./day for 60 days.	
Weaning weight	450 lb.
Winter gain	169 lb.
Pasture gain	90 lb.
Weight at breeding	709 lb.

b. Heifers should continue to gain 1.0 pounds-1.25 pounds/day on grass until winter and weigh 850 lb.-900 lb. going into winter. They should gain about a pound a day during second winter and approach calving weighing 950-1000 pounds.

IV. Breeding

A. Heifers reach sexual maturity at 14-16 months of age; size and weight at puberty should be the determining factors as to time of breeding.

1. Heifers that are too small at breeding (less than 600 pounds) may not mature out and get as large as heifers that are heavier.
2. Sexual maturity takes at least 14 - 16 months and all heifers should be allowed this amount of time.
3. Many exotic-bred heifers may weigh 650 to 700 pounds before they are 14 months of age, but this does not mean they are sexually mature.

B. All heifers should be bred by the time they are 24 months old.
1. If they are still open they should be culled, because they are already one calf behind some of their more productive herd mates. Hard breeding is an inherent trait. .
2. There are enough breeding problems without "breeding more in."

V. Calving

A. The last three months of gestation and the first three months after calving are very important in the productive life of a first-calf heifer.

B. Feeding during the last three months should be determined by body condition.
1. Thin heifers should receive some additional gain, and heavy heifers should be held back and not allowed to get too heavy.
2. During the first three months of production, a heifer should not have to compete with larger, rougher, more mature cows for feed.
3. She should be fed so as to:
   a. Regain weight lost in calving
   b. Maintain a normal growth pattern
   c. Produce milk
   d. Rebreed rapidly
4. This requires increased levels of energy, protein, vitamin, and mineral intake. Without this type of care, it will be difficult to get heifers rebred.

Suggestions for Teaching the Lesson

I. Developing the Situation

A. Things to be brought out by the teacher:
1. Recommended practices in handling replacement heifers.
2. Values in doing a good job with replacement heifers.

B. Things to be brought out by class members:
1. How many raise their own replacement heifers?
2. Experiences with late calving cows.
3. Problems in "catching up" in subsequent years.

II. Conclusions

A. To raise productive replacement heifers, a beef producer should select large, growthy, structurally correct heifers that are sound and out of good producing cows.

B. Producers should control the nutrient level of growing replacement heifers so they can grow to desired size and not get too fat.

C. Replacement heifers should be sexually mature before they are bred and also have adequate size to make desirable mature females. Seventy-five percent of all replacement heifers should be bred by the time they are 20 months old.

D. Good management is needed to get the replacement heifer to come into calving in thrifty condition, calve properly, start production effectively, regain body condition, and rebreed easily.

III. Enrichment Activities

A. Tour a quality operation.

B. Secure performance (wt.) records on class members' heifers.

C. Attend a replacement heifer sale.

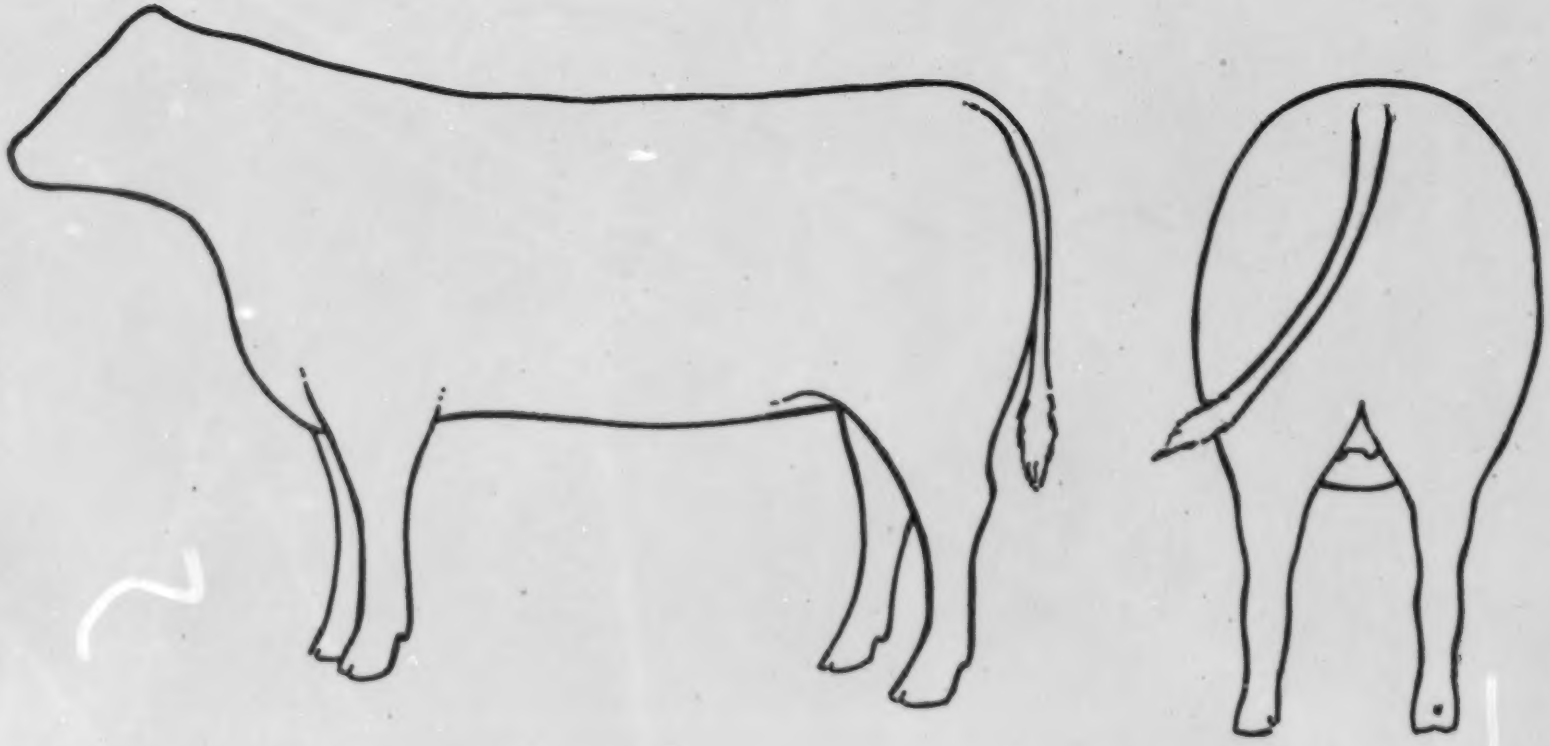
D. Attend UK Beef Field Days.

IV. Suggested Teaching Materials

A. References
1. Beef Production, Bundy & Diggins, pp. 136-138.
2. Kentucky Bulletin ASC 8.
3. Beef Cattle Science, Ensminger, pp. 206-217.

B. Audio-visuals
1. Masters
-1 Ideal Beef Heifer (conformation)
-2 Nutrition Chart
A Weanling Heifer
B Pregnant Heifer
C Nursing Heifer

IDEAL BEEF HEIFER CONFORMATION



106-6-1

Daily Nutrient Requirements. Weanling Replacement Heifer*

Body weight, lb	Average Daily Gain, lb	Dry Matter, lb	Total Protein, lb	TDN, lb	CA, lb	P, lb	Vitamin A, 1000 I.U.
300	0.55	6.0	0.7	4.0	0.018	0.015	6.1
	1.10	6.0	0.8	4.5	0.026	0.022	6.1
	1.65	6.0	0.9	5.1	0.037	0.029	6.1
500	0.55	11.1	1.1	6.3	0.020	0.020	11.2
	1.10	12.9	1.4	7.9	0.030	0.025	13.1
	1.65	13.8	1.5	9.2	0.040	0.033	13.9
700	0.55	14.3	1.3	8.1	0.025	0.025	14.4
	1.10	18.9	1.9	10.8	0.034	0.034	19.0
	1.65	19.7	2.1	12.4	0.039	0.035	19.8

**Adapted from Nutrient Requirements of Beef Cattle, Fourth revised edition, 1970. National Academy of Sciences, Washington, D. C. 1970.*

SOURCE: Ky. Bulletin ASC-8.

106-6-2A

Daily Nutrient Requirements, Pregnant Heifer, Last 80-120 Days of Gestation*

Body weight, lb	Average Daily Gain, lb	Dry Matter, lb	Total Protein, lb	TDN, lb	CA, lb	P, lb	Vitamin A, 1000 I.U.
700	1.10	18.9	1.9	10.8	0.034	0.034	19.0
	1.65	19.7	2.1	12.4	0.039	0.035	19.8
900	0.00	12.6	1.0	7.2	0.022	0.022	12.6
	0.55	17.3	1.4	9.9	0.032	0.032	17.5
	1.10	22.9	2.0	13.0	0.041	0.041	23.0

**Adapted from Nutrient Requirements of Beef Cattle, Fourth revised edition, 1970. National Academy of Sciences, Washington, D. C. 1970.*

SOURCE: Ky. Bulletin ASC-8.

Estimated Daily Nutrient Requirements, Nursing Heifer, Immediately After Calving*

Body weight, lb	Dry Matter, lb	Total Protein, lb	TDN, lb	Ca, lb	P, lb	Vitamin A, 1000 I.U.
600	18	3.0	16	.057	.057	33.2
700	21	3.0	16	.057	.044	36.0
800	24	3.0	16	.057	.046	36.0
900	27	3.0	16	.062	.048	38.5

**Estimated amounts allow for weight gain and milk production.*

SOURCE: Ky. Bulletin ASC-8.

106-6-2C

Lesson 7

MAINTAINING HEALTH OF THE BEEF HERD

Objective -- To develop the effective ability of farmers to manage the health of the beef-cow herd.

Problem and Analysis -- How should we manage the health of the beef-cow herd?

-Importance of good nutrition
-Disease problems
-Parasite problems

Content

I. Importance of Good Nutrition

A. Dr. Newell Hicks of the Woodford Vet Clinic states that, "Ninety percent of all vet calls could be eliminated if a sound nutrition program were practiced by all livestock producers."

B. Inadequate nutrition can lead to:
1. Weakened animals that are more susceptible to many diseases.
2. Low production.
3. Poor conception rates.
4. Dystocia (birth problems).
5. Poor fertility in bulls.

II. Disease Problems

A. Diseases that affect bulls
1. Most important of these diseases are the venereal diseases which can be spread rapidly by an infected bull during the breeding season.
a. Brucellosis or Bang's disease. Caused by three organisms (one in cattle, one in swine, one in goats). Brucella abortus - contagious abortion in beef can be caught by consuming infected feed or by contact. The organism affecting cattle can cause undulant fever in man. A blood test is a safe, reliable method of diagnosing the disease. This test is based on the following: The blood stream of an infected animal contains an antibody, known as agglutinin. When blood serum containing this substance is brought in contact with a suspension of Brucella organisms (called an antigen) it causes

the organisms to adhere to one another and form clumps. This action, known as agglutination, constitutes a simple test for diagnosing brucellosis in the living animal.

b. Vibrosis
   (1) an infection of reproductive organs of cattle causing infertility and abortion
   (2) causes abortion in middle third of pregnancy
   (3) causes rebreeding difficulties
   (4) is spread by contact with diseased animal, contaminated feed, water, environment
   (5) can be prevented by vaccination

c. Trichomoniasis
   (1) the bulls are the usual source of infection
   (2) is usually transmitted at time of breeding
   (3) causes irregular sexual cycles, early abortion usually 60-120 days after breeding, or resorption of fetus and whitish vaginal discharge

2. Respiratory disease (tuberculosis)
   a. A chronic infectious disease of man and animals
   b. Spreads slowly
   c. Characterized by the development of nodules (tubercules) that may calcify and turn into abscesses
   d. Affects mainly lymph nodes
   e. Cattle susceptible to all three kinds of tuberculosis germs (human type, Bovine type, or bird type)
   f. Removal of infected animals is the only effective control

B. Diseases that affect cows
   1. The diseases previously discussed in relation to bulls can also affect cows.
   2. In addition, two others are important:
      a. Leptospirosis
         (1) May infect humans
             -skin contact of organisms
             -eating uncooked beef
         (2) Affects all ages and types of cattle
         (3) Symptoms are abortion occurring at any time, bloody urine, anemia, ropy milk, high temperature, and poor appetite
         (4) Follow recommended preventive measures:
             -blood test before purchase
             -use clean feeding place
             -keep feed supplies free from rodents and birds
      b. Udder Problems (mastitis)
         (1) Udders on beef cows need much more attention than most producers give.
         (2) The udder function is becoming more and more important every year with the need for more milk and the desire to wean heavier calves.

(3) Udder problems can be held down by
-keeping cows on clean ground
-providing a dry resting place
-properly bedding loafing areas if barns or sheds must be used

(4) Two types of mastitis
(a) Acute
-most severe
-very painful
-quarter swells
-milk is stringy
(b) Chronic
-milker; may go undetected until it reaches the acute stage
-lumpy, watery milk

(5) Usually only affects one quarter at a time.
(6) Responds to treatment.
(7) Eliminate places and ways cows may injure udders to control the problem.

C. Newly purchased animals should:
1. Always be tested for Bang's and lepto if they are to be kept for breeding or come in contact with other breeding animals already on the farm.
2. Not be turned out with the herd immediately.
3. Have at least a 14-day isolation period to be sure they are in good health.

III. Parasite Problems

A. As cattle numbers increase and the concentration of cattle on land or in confinement increases, so will the problem of controlling cattle parasites.

B. Parasites are a continuous problem that can cause large economic losses to producers.

C. There are over 100 parasitic organisms that can affect cattle. Fortunately not all are a problem in the United States

D. Realistic control can be expected and obtained from a properly managed parasite-control program.

E. Types of parasites*
1. Internal parasites of major importance in Kentucky include:
a. Stomach worms
b. Nodular worms
c. Tape worms

*NOTE: Check with the local veterinarian to find out what parasites cause the most trouble and what are the most effective control methods to use in your county.

2. External parasites of major importance in Kentucky include flies (several types, including face, heel, horn, and stable), lice, and grubs.

Suggestions for Teaching the Lesson

I. Developing the Situation :

A. Things to be brought out by the teacher:
1. The amount of money farmers spent on vet calls last year in the county.
2. The amount of monetary losses to producers due to:
-poor nutrition
-disease problems
-parasites

B. Things to be brought out by class members:
1. Health problems in the community.
2. Ideas as to how to improve herd health.

II. Conclusions

A. To effectively manage the health of a beef-cow herd, a producer must know the nutrient needs of the cattle he is handling and provide for these needs as soundly and as economically as possible.

B. The producer must realize the varying nutrient needs of dry cows, pregnant cows, nursing cows, growing heifers, growing steers, and herd bulls, which are all different and must be managed accordingly.

C. The producer must recognize disease and parasite problems and know where to go for help.

D. The producer should carry on a preventive system of health care.

E. Every producer should carry out a parasite-control program.

III. Enrichment Activities

A. Invite a veterinarian to speak to the class on preventive health care.

B. Tour the Diagnostic Laboratory, UK.

C. Tour local vet clinic.

D. Secure specimens/slides of common parasites.

E. Have samples of vaccines, medicines, and wormers.

IV. Suggested Teaching Materials

A. References
1. Beef Cattle Science, Ensminger, ch. 12.
2. Beef Production, Bundy & Diggins.
3. Veterinarian's Handbook, Lederle.
4. UK Bulletins, VET-2, ENT-11, and ENT 4.
5. Animal Sanitation and Disease Control, Dykstra.

B. Audio-visuals
1. Masters
-1 Common noninfectious diseases
-2 Common infectious diseases
-3 Common external parasites
-4 Common internal pasasites

COMMON NONINFECTIOUS DISEASES OF BEEF CATTLE

Bloat

Grass Tetany

Plant Poisoning

Tetanus

COMMON INFECTIOUS DISEASES OF BEEF CATTLE

Brucellosis

Blackleg

Shipping Fever

Foot Rot

Pink Eye

COMMON EXTERNAL PARASITES OF BEEF CATTLE

Screwworm

Grubs

Cattle lice

Flies (horn, stable, face)

Ticks

Mites

COMMON INTERNAL PARASITES OF BEEF CATTLE IN KENTUCKY

Stomach Worms

Modular Worms

Tapeworms

Lesson 8

MANAGING THE STOCKER PROGRAM

Objective -- To develop the effective ability of farmers to manage a stocker program in beef production.

Problem and Analysis -- How should we manage a stocker program in beef production?

-Definition
-Objectives of a stocker program
-Stocker grades
-Selection of stockers
-Feeding stockers
-Stocker health management
-Buying and selling

Content

I. Definition. A stocker is a young steer or heifer that is purchased or raised for the purpose of being grown out rather than being finished for slaughter. Stockers have a narrow price spread and must be managed as economically as possible. This is a popular program in many parts of Kentucky, but one that may be eliminated in the future. This will be due to heavier weaning weights from better-producing cows and the use of larger bulls or cross breeding to increase the weaning weights to the desirable starting range for feed lots, 650# and heavier.

II. Objectives of a Stocker Program.

A. To utilize an available supply of reasonably high-quality dry roughages and/or pasture.

B. To market the grass available on Kentucky farms.

C. To receive a return from grass without the need for or use of a large investment in forage-handling machinery.

D. To put on the most economical gains possible.

E. To make money.

III. Stocker Grades.

A. Stocker cattle are graded according to quality. These grades are the same for both steers and heifers.

B. The grades and factors which go into each are:
Fancy
Choice
Good
Standard
Utility

IV. Selection of Stocker Cattle. Stocker should be selected according to three major considerations.

A. Grade potential
1. As grades of feeder cattle improve, so does the price.
2. A stocker should be selected that has the capability of advancing in grade during the grazing period, such as from Good to Choice.

B. Health
1. A stocker should be healthy.
2. Many stockers are thin when they are found at the cattle markets. Cattle can be thin and still be healthy, but producers should be careful when purchasing these animals.
a. Alertness and movement may help determine whether a thin animal is healthy or not.
b. Thin cattle will drift (lose weight) less when being moved and handled, consequently will begin to put on profit-making pounds of gain sooner.

C. Price. The improvement of grade will improve the price range for the stocker at market time. This will help widen the profit margin on stocker cattle.

V. Feeding Stocker Cattle.

A. Stockers should be fed to gain 1.0 to 1.5# per day when not on grass. They should gain 1.5# per day or more when on grass.
1. Dry roughage at the rate of ten pounds per day plus two pounds of a protein supplement should secure the desired gains when not on grass.
2. A trace-mineral and salt mixture, and a source of vitamin A should be available, free choice, to growing cattle whether on dry roughage or on grass.

B. Getting new cattle started on feed may be a problem to many producers. A method that might be very helpful in solving this problem is the "super-safe way of getting cattle on feed" (see Master 2).

VI. Stocker Health Management.

A. Since a high percentage of stocker cattle are purchased and not raised, most will have some other point of origin than the local area. On many cattle markets this information is not available when purchasing. Some may be local to the area and have some resistance already built up to combat minor local health problems. Others may have been shipped in from another state, another climatic region, and not have any immunities.

B. The primary fact that the cattle have been shipped from the farm to the market, shuffled, crowded, placed in contact with other cattle, and then hauled to another farm will place them in a stressed condition. Any major weaknesses in the health of an animal will usually come out more quickly after the stress of being marketed.

C. The health practice used in a stocker cattle program should be handled from a preventive standpoint because, with such a narrow profit margin to operate on, prevention is more practical than cure.

D. Typical preventive vaccination program.
   1. Vaccinate against:
      -Blackleg and Malignant Edema
      -IBR - Bovine Rhinotracheitis
      -BVD - Bovine Virus Diarrhea
      -PI3 or SF4 - Bovine Pneumonia
      -Leptospirosis
   2. In addition, all cattle should be wormed, sprayed, and provided with some type of continual help in controlling the external parasite pests common to the area.

VII. Buying and Selling Stocker Cattle.

A. The price spread must be considered in purchasing any type of feeder cattle. Profit in stockers is often determined by the way they are purchased.

B. Poor doers should be culled early.

C. Hold stockers as long as they are gaining on available roughage.

D. Analyze beef markets, including futures, to determine best time to sell.

E. Contract selling may help lock-in profits.

Suggestions for Teaching the Lesson

I. Developing the Situation

A. Things to be brought out by the teacher:
1. Number of stockers handled in the county.
2. Potential for stockers: beef numbers, acres of grass, etc.
3. The profit potential in utilizing grass that is not consumed each year.

B. Things to be brought out by class members:
1. Methods they use to market forage.
2. Effect of stockers on their total farm income.
3. Experiences with stockers.

II. Conclusions

A. Farmers should utilize stockers to market excess forage.

B. Higher profits can be made by buying steers which increase in grade during the feeding period.

C. Select stockers for grade potential, health, and price.

D. Stockers should be fed to gain 1 - 1½ lbs. when not on grass, and over 1½ lbs. when on grass.

E. Farmers must practice a vigorous health program (vaccination and periodic parasite control) to prevent stocker losses.

F. Buy stockers low, feed economically, and sell at top market grade prices.

III. Enrichment Activities

A. Invite a marketing specialist to speak to the group.

B. Attend stocker cattle sales.

C. Form a stocker buying and marketing cooperative.

D. Have a local veterinarian speak on stress and how to bring stockers out of this condition.

IV. Suggested Teaching Materials

A. References
1. Beef Cattle Science, pp. 671-681, 731-740.
2. UK Bulletins, ASC-22, VET-4.
3. Beef Production, ch. 10 and 11.
4. Cattle Futures Handbook
5. The Marketing of Livestock and Meat, ch. 6-9, 13.

B. Audio-visuals
1. Masters
-1 Stocker grades
-2 Getting stockers on feed
-3 Stress factors

STOCKER CATTLE GRADES

Prime

Choice

Good

Standard

Utility

SUPER-SAFE WAY OF GETTING CATTLE ON FEED

1. Start out with 1 lb. of finishing ration per head per day.

2. Increase the feed by 1 lb. per day until 1% of body weight is reached.

3. Then, every third day, increase as follows:

   -1/4 lb. for calves

   -1/2 lb. for yearlings

4. Continue increasing feed until the animal is on full feed (1.5 to 2% or approximately 1.75% of body weight in feed is consumed daily).

SOURCE: Dr. Neil Bradley, Dept. of Animal Science, University of Ky.

106-8-2

STRESS FACTORS

1. Weaning*
2. Castration
3. Dehorning
4. Vaccination
5. Deworming
6. Spraying
7. Parasitism
8. Handling
9. Transporting*
10. Exhaustion*
11. Overcrowding*
12. Excessive use of persuaders (i.e. electric prods and canes)
13. Anxiety and fright
14. Poor nutrition
15. Lack of feed and water
16. Change of feed and water*
17. Change of environment
18. Exposure to inclement weather*
19. Use of abortive agents in heifers
20. Subclinical viral and bacterial infections
21. Unsanitary equipment and quarters*
22. Mixing cattle of different origins together.

*Most commonly mentioned problems.

SOURCE: Ky. Bulletin VET-4.

Lesson 9

MEETING BEEF EQUIPMENT NEEDS

Objective -- To develop the effective ability of farmers to select, design, and use beef equipment properly.

Problem and Analysis -- How should we select, design, and build beef equipment?

-Feeding equipment
-Corral designs
-Working chutes
-Head gates
-Loading chutes

Content

I. Feeding Equipment

A. Feeding equipment is used for two major reasons:
1. Feed troughs control placement of feed and reduce wasted feed.
2. Feeders are more sanitary than feeding on the ground, since they reduce contamination of feed.

B. Feed Space Requirements
1. When all animals eat at once, allow the following linear space:
a. 18 in. - 22 in. for calves up to 600#
b. 22 in. - 26 in. for cattle 600# to market weight
c. 26 in. - 30 in. for mature cows
2. When feed is always available allow:
a. 4 in. to 6 in./head for hay or silage
b. 3 in. to 4 in./head for grain and supplement
c. 6 in./head grain and silage
3. Width of feeders*
a. Allow 18 in. bottom width if fed from one side
b. Provide 40 in. - 48 in. bottom width if fed from both sides
c. Allow 54 in. - 60 in. if bunk is divided by mechanical feeder
4. Throat height should be a maximum of:
a. 18 in. for calves
b. 22 in. for feeders and mature cows
c. 30 in. when hogs are run with cattle
5. Trough depth should be:
a. 6 in. - 8 in. for grain
b. 8 in. - 10 in. for silage and/or hay

*NOTE (Variation depends on size of animals being fed.)

6. Sides. Vertical sides reduce the amount of feed pushed out by the cattle, as compared to slanting sides.

C. Materials
1. Bunk materials should be as strong as is economically possible.
2. Two-inch hardwood (Rough Oak) is preferred over 1" for sides to bunks. Two-inch flooring, when properly braced (at least 2 x 4 of same material), will also withstand the pressure from animals walking in the feeders.
3. A four-inch pipe makes a desirable framework.
4. With angle iron, use 2 in. x 3 in. or 3 in. x 3 in. of 3/8 in. thickness or greater.
5. Salt and mineral feeders need at least a two-inch skeletal frame for desirable strength; however, they can be covered effectively (boxed) with one-inch material.
6. The base of any feeder should be broad and thus help keep the feeder from being tipped over easily.

II. Corral Designs

A. Corral space requirements
1. Holding pens require 20 sq. ft. per mature animal
2. Crowding pens should be about 150 sq. ft. (truckload size)

B. Corral suggestions
1. Post specifications
   a. Length 8 to 10 ft.;
      8 ft. for outside fence; 10 ft. for working chutes.
   b. Set posts 3 ft. to 4 ft. in ground. (Posts set in concrete will be stronger.)
   c. Space posts 6 to 8 feet apart; 8 feet on outside fences; 6 feet on alleys and chutes.
   d. Diameter should be 6 in. or greater at the top.
2. Use one-inch siding (at least 1 in. x 6 in.) for outside fences; use two-inch board for the top board on this kind of fence.
3. Reinforce wire panels with wooden 2 in. x 6 in. or 2 in. x 8 in. at maximum stress points, such as the top and belly height (24-28 in.).
4. An outside barn wall makes an excellent corral wall, especially when the barn wall is supported on a concrete foundation.
5. Corral fences should be about five feet high (higher if needed).
6. Corral design should be made to fit location of corral and size of herd to be handled.

III. Working Chutes

A. Working chute dimensions
   1. Length: 18-30 feet
   2. Inside bottom width, 26 in. maximum (for vertical sides), slant walls, 12 in. - 16 in.
   3. Straight sides make it harder for animals to turn around in than do chutes with slanting sides.

B. Material specifications
   1. Posts should be 10-12 ft. long, set 3-4 ft. deep (setting in concrete is recommended), with a 6 ft. spacing between posts, and a cross brace at the top of the post to help strengthen the sides. However, all posts may not need to be cross braced. Posts should be 6 in. in diameter at the top.
   2. Side boards should be of 2 in. material, either 2 in. x 6 in. or 2 in. x 8 in. Solid sides up to chest height will prevent leg injuries.
   3. The head gate should be mounted at the end of the chute which leads into a holding pen. Gates at the end of the chute next to the head gate will help in releasing cattle and make them more accessible for working.
   4. At least one blocking gate should be installed in a working chute. It should be close to the section near the head gate to eliminate crowding while animals are being worked. Additional blocking gates may be installed to eliminate overcrowding of animals in longer chutes. Curved chutes aid in flow of animals.
   5. A small access door is needed at the tail of the animal when caught in the head gate to add more versatility to jobs done in the working chute.
   6. Solid wall construction near the head gate will allow for easier catching with the head gate.

IV. Headgates. These structures should be:

A. Made of strong material.

B. Constructed to walk through or swing open.

C. Constructed to allow full head restraint (for eye work, implanting, dehorning, etc.)

D. Constructed so animals can get up if they lose their footing, and not be caught in a strangling position.

E. Built to open at the top and pivot at the bottom so small calves can walk through.

F. Built with a full opening 22-26 in. so mature cattle can walk through.

G. Constructed to close to a 3 in. opening to catch very young calves.

H. Able to hold an animal securely under its own pressure lowing the "catcher" maximum freedom.

V. Loading Chutes. Suggested characteristics are as follows:

A. Width should be 30 in.-42 in. (The narrower - to a minimum of 30 in. - the better to prevent turning around in chute.)

B. Portable chutes on wheels or skids may be more useful than permanent chutes.

C. Sides should be constructed with maximum strength.

D. Bottoms should be sound with adequate supports and strength. Steps, cleats, or a rough surface are used to eliminate slipping.

E. Solid sides may be used to make loading easier. (Animals tend to run for holes when being confined and handled. The fewer holes the better.)

F. Chutes should not be too steep (not over a 30° angle).

G. Walls should be at least five feet high from the bottom of the incline.

Suggestions for Teaching the Lesson

I. Developing the Situation

A. Things to be brought out by the teacher:
1. Proper equipment can save time, injury to stock or operator, and material.
2. Farmers can economically construct much of their own needed equipment.
3. Types of equipment available.
4. Equipment costs.

B. Things to be brought out by class members:
1. Equipment now used on their farms.
2. Future equipment needs.
3. Experience with different materials and methods of construction.

II. Conclusions

A. A producer should use the proper feeding equipment to get the most economic use of feed and make feeding as sanitary as possible.

B. Feeders should be designed to fit the animals, constructed to discourage waste, and built to last as long as is economically necessary.

C. A corral will improve the quality of beef produced by making needed handling easier.

D. Corrals can be designed to fit almost any area. The side of a barn may be used as one side of the holding pens.

E. Corral fences should be sturdily built and reinforced at the high-tension spots.

F. Working chutes should be at least 6-7 feet long (one cow length). They may be longer, and curved to improve cattle movement. The entrance should be wide and funnel shaped. It should end up at the straight part of the catch chute.

G. Headgates should be strong, operable by one man, walk-through, tight and secure once the animal is caught.

H. Loading chutes should be narrow, moderately sloped, with high sides and solid footing.

III. Enrichment Activities

A. Construct equipment in the school shop.

B. Provide beef equipment plans to class members.

C. Secure the services of the Extension Agricultural Engineer to speak and demonstrate proper construction.

IV. Suggested Teaching Materials

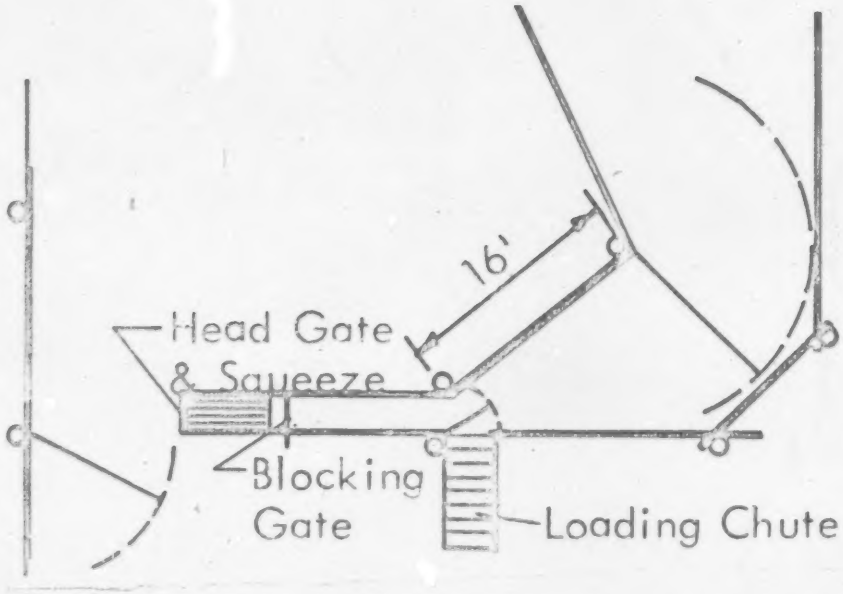
A. References

1. Beef Housing and Equipment Handbook.
2. Handbook of Livestock Equipment by Juergenson.
3. Beef Production, pp. 208-230.
4. Plans for Beef Breeding and Equipment, UK Bulletin AEN-11.

B. Audio-visuals

1. Masters
   - -1 A-D Corrals
   - -2 A-D Feed Bunks
   - -3 A,B Salt/Mineral Feeders
   - -4 A,B Working Chutes
   - -5 A,B Blocking Gates
   - -6 Working Fences
   - -7 Fence Pass
   - -8 A,B Headgate
   - -9 Hoof Trimming Table
   - -10 Cattle Guard

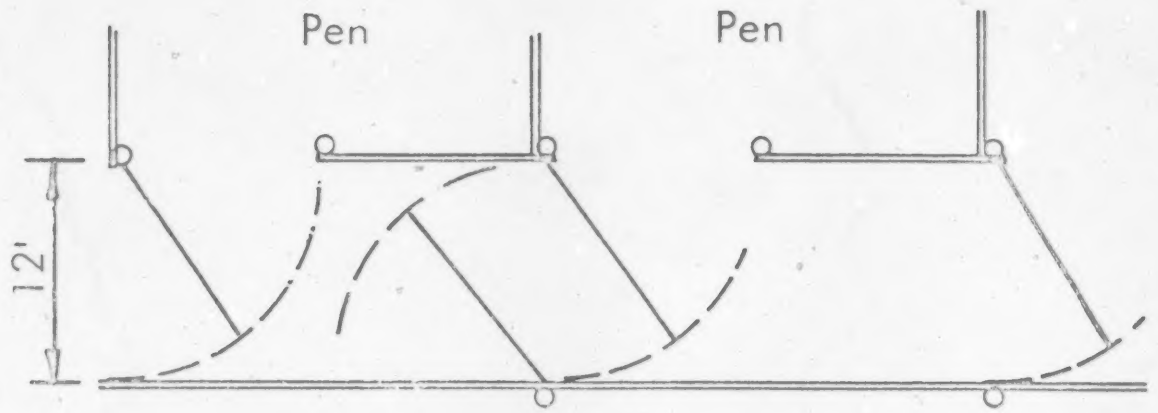
FUNNEL CROWDING PEN



106-9-1A

Source: Beef Housing and Equipment Handbook, MWPS-6.

CORRAL

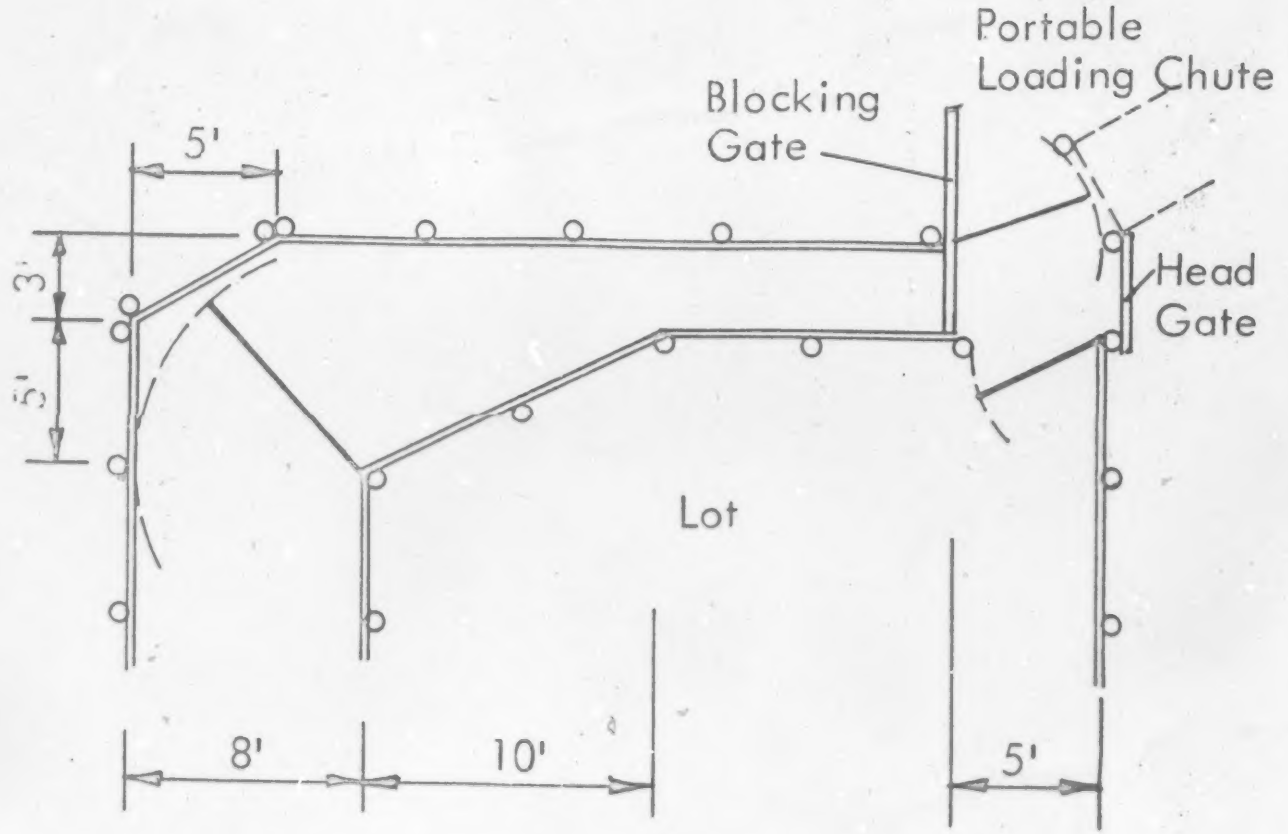


SORTING ALLEY
With Cross Gates, Can Be Used For Spraying & Holding

Source: Beef Housing and Equipment Handbook, MWPS-6.

106-9-1B

CORRAL

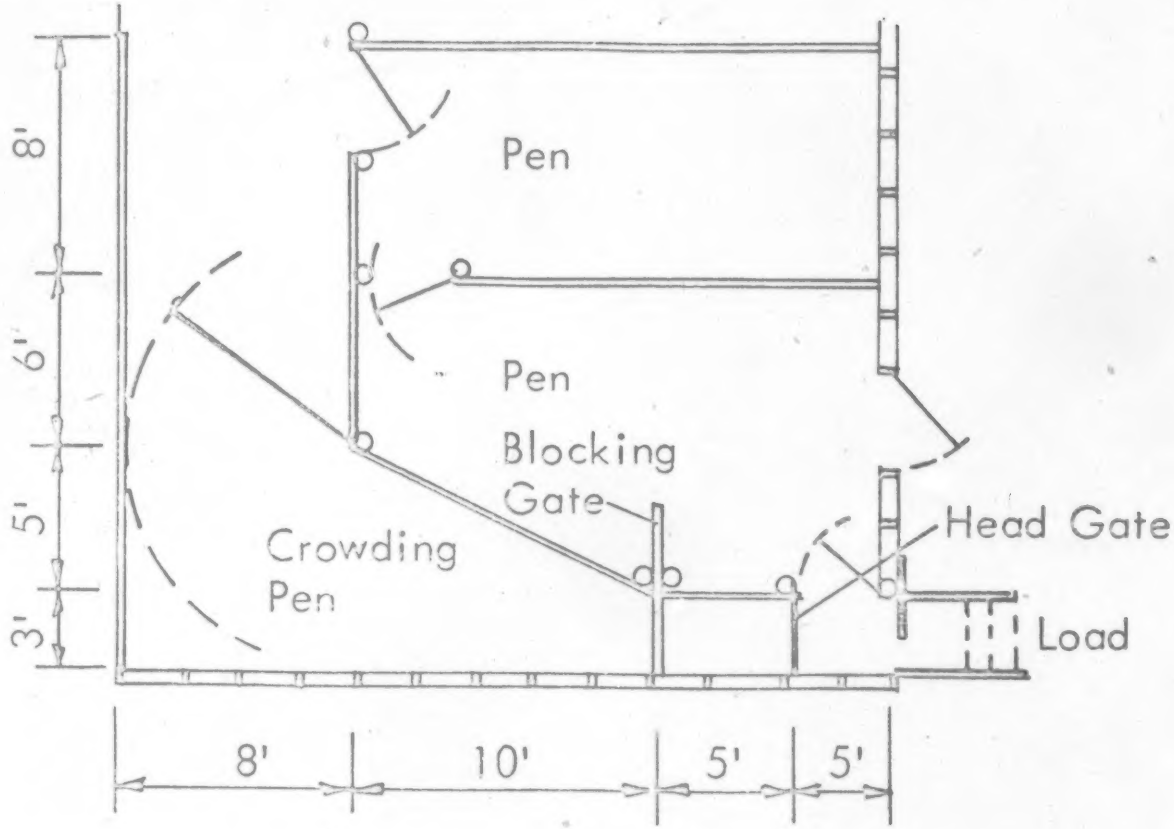


IN LOT CORNER

Source: Beef Housing and Equipment Handbook, MWPS-6.

106-9-1C

CORRAL

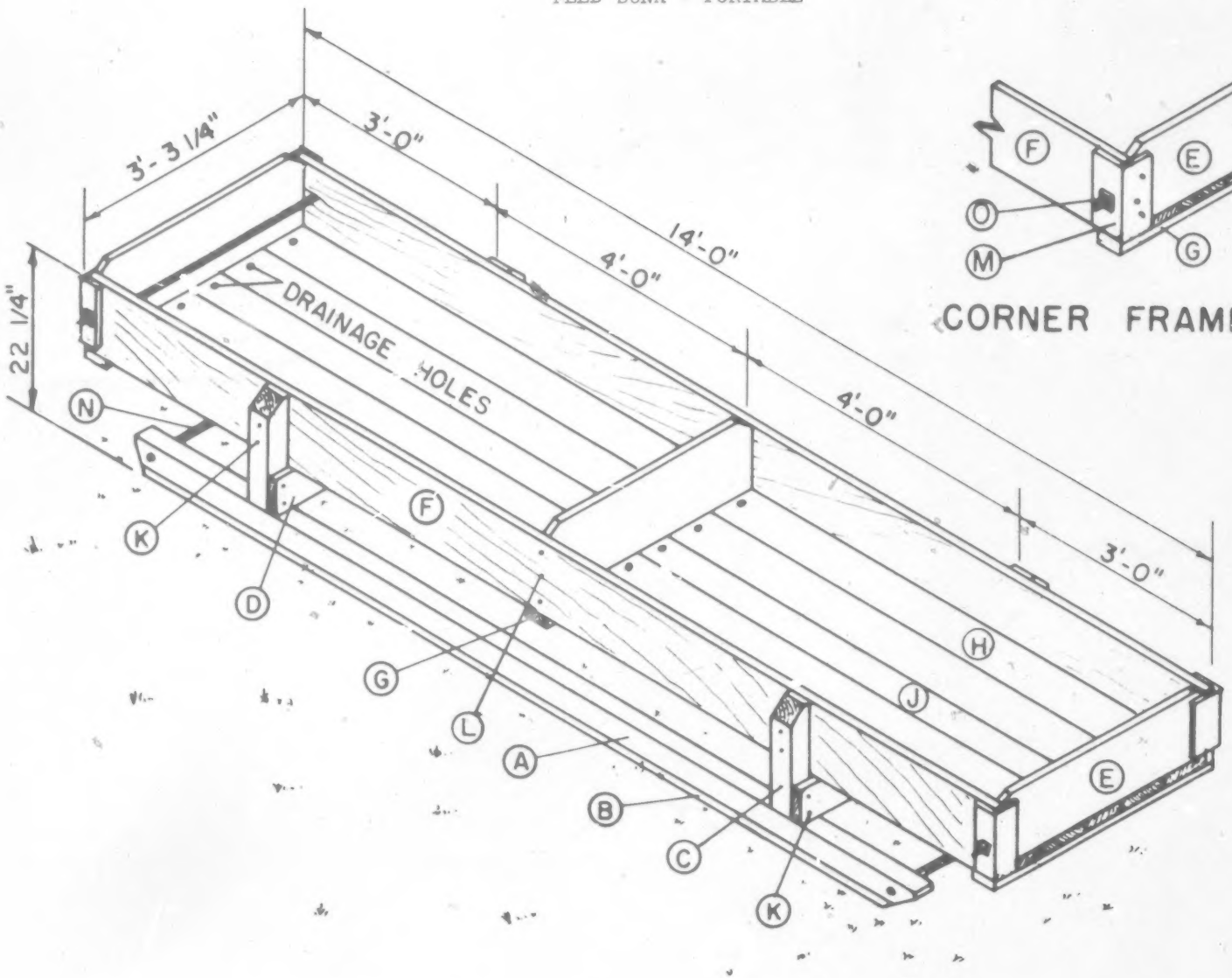


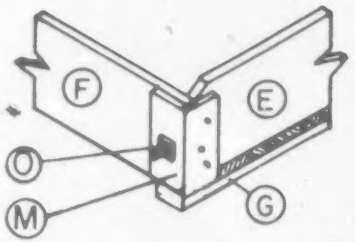
IN BARN CORNER

Source: Beef Housing and Equipment Handbook, MWPS-6.

106-9-1D

FEED BUNK - PORTABLE



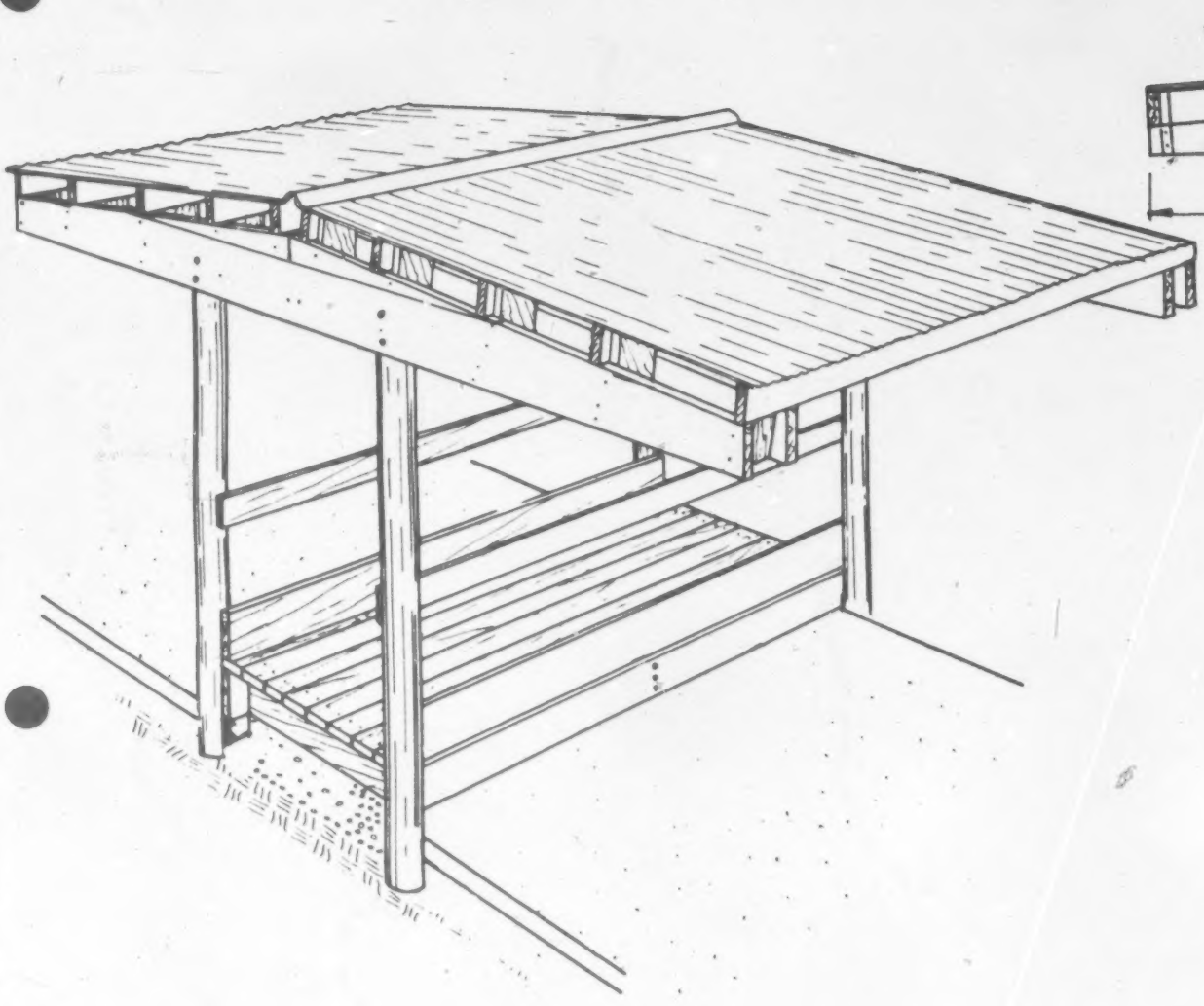


CORNER FRAMING

106-9-2A

Source: Beef Housing and Equipment Handbook, MWPS-6.

FEED BUNK-COVERED



BILL OF MATERIALS
12' Section

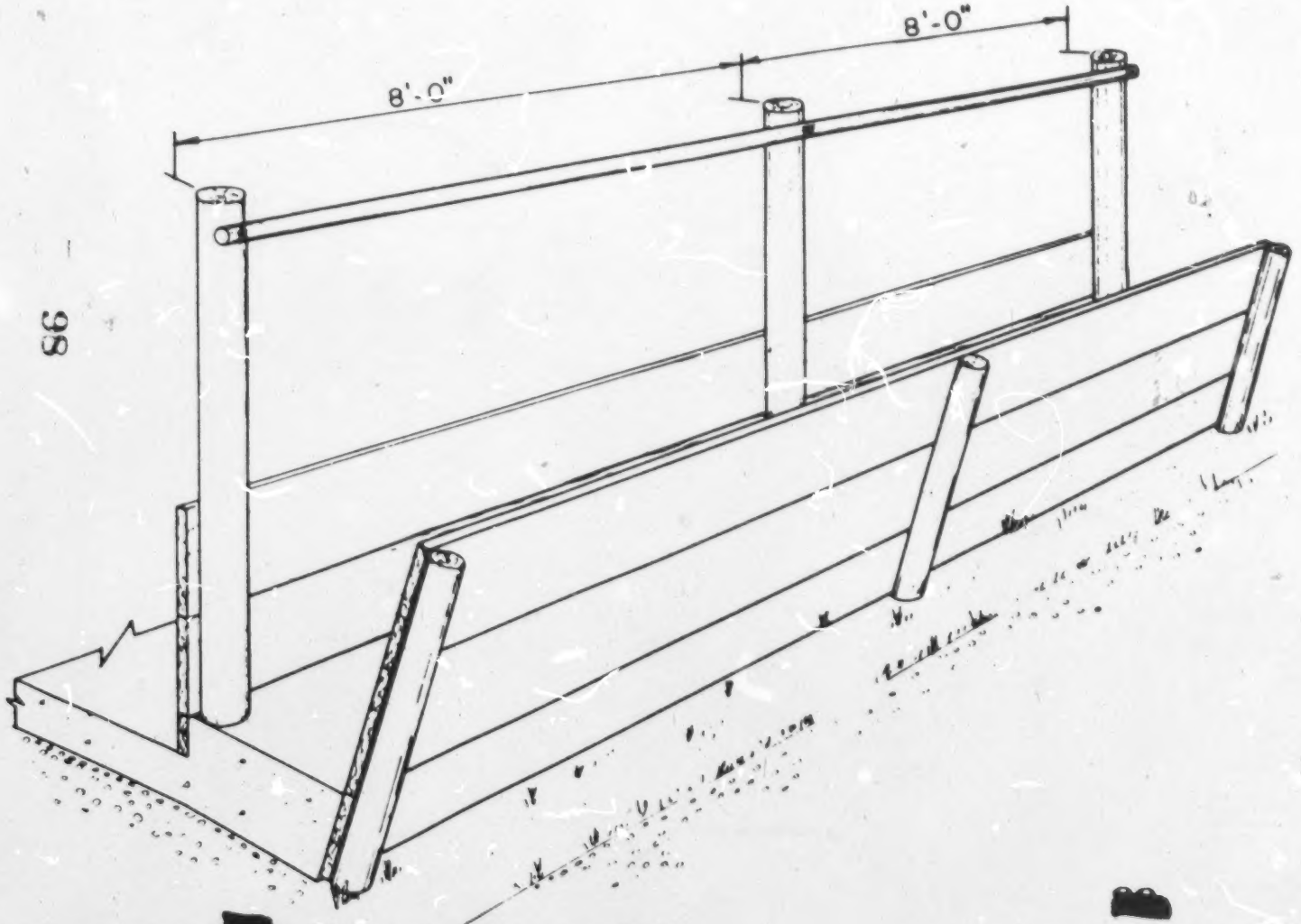
No.	Size
4	2" x 10" x 20'-0"
12	2" x 6" x 12'-0"
2	2" x 8" x 12'0"
3	2" x 10" x 4'-5'
2	2" x 6" x 10'-0" for Purlin Ties
	2" Tongue & Groove Flooring

Source: Beef Housing and Equipment Handbook, MWPS-6.

106-9-2B

FEED BUNK, FENCELINE, CONCRETE

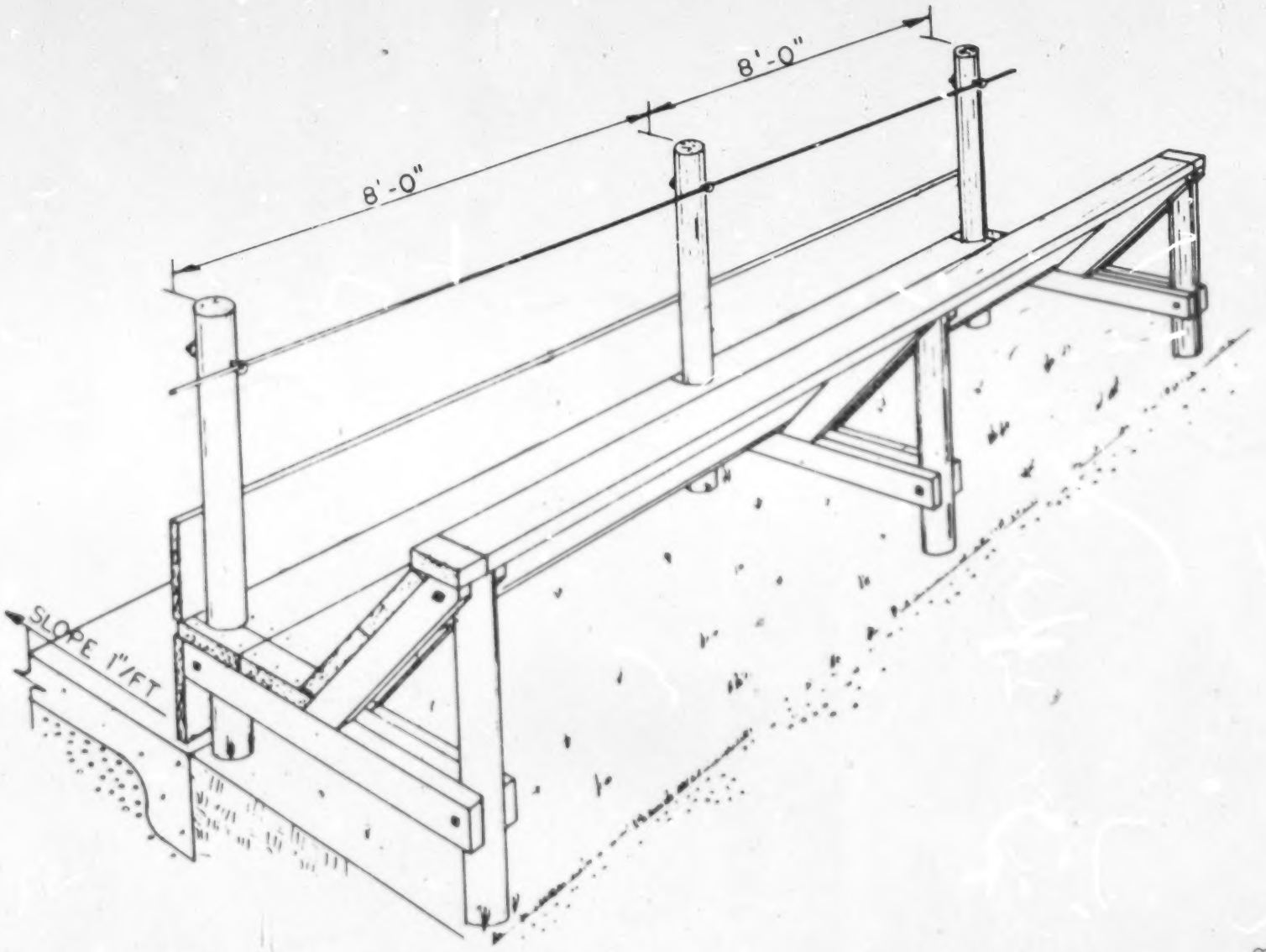
HARDWARE: Galvanized
LUMBER: Pressure Treated
SEE: Fasteners
Bunk Planning
for floor heights, etc.



106-9-2C

Source: Beef Housing and Equipment Handbook, MWPS-6.

FEED BUNK [redacted] ENCELINE, WOOD



Source: Beef Housing and Equipment Handbook, MWPS-6.

[redacted]

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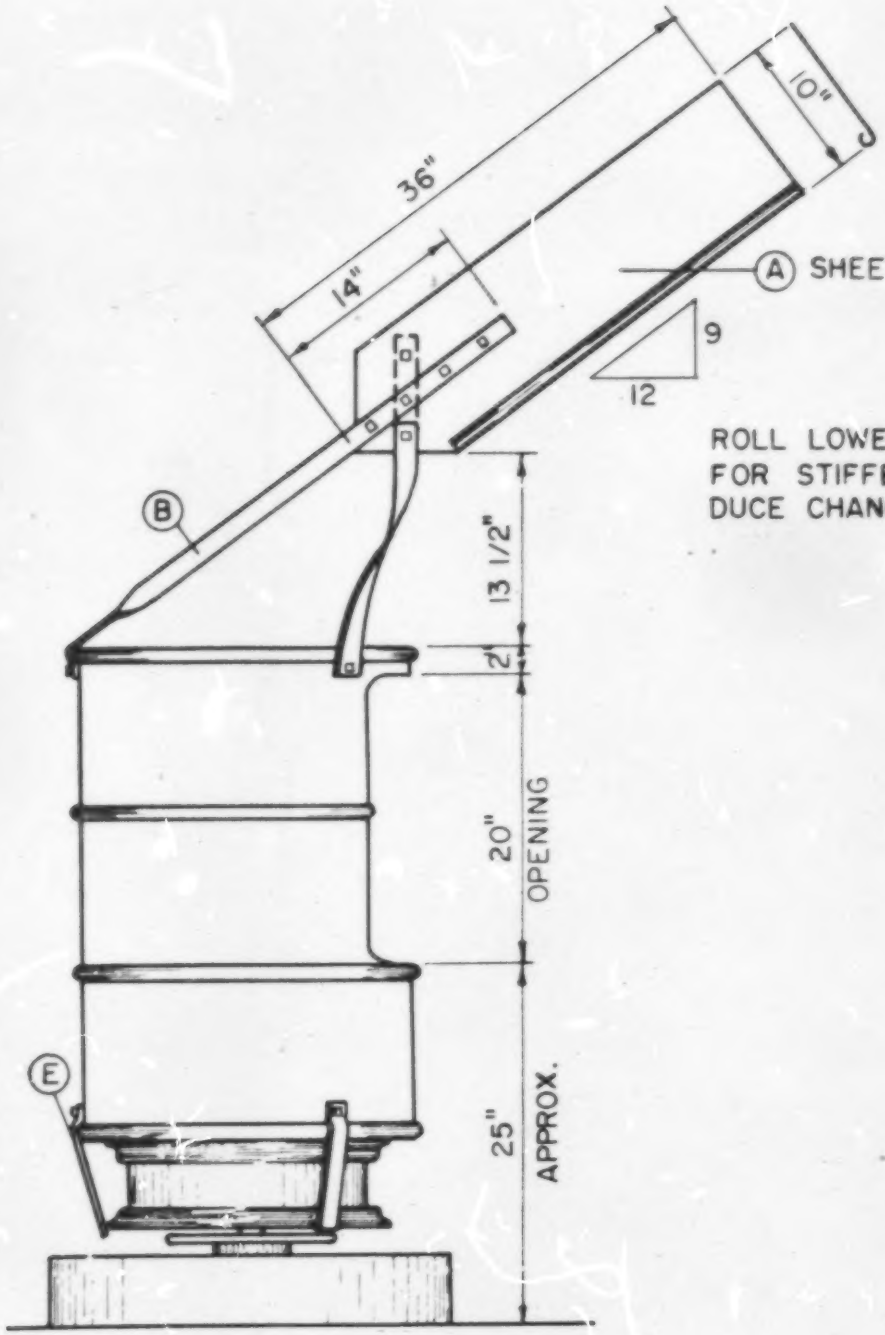
106-9-2D

99

98

SALT/MINERAL FEEDER

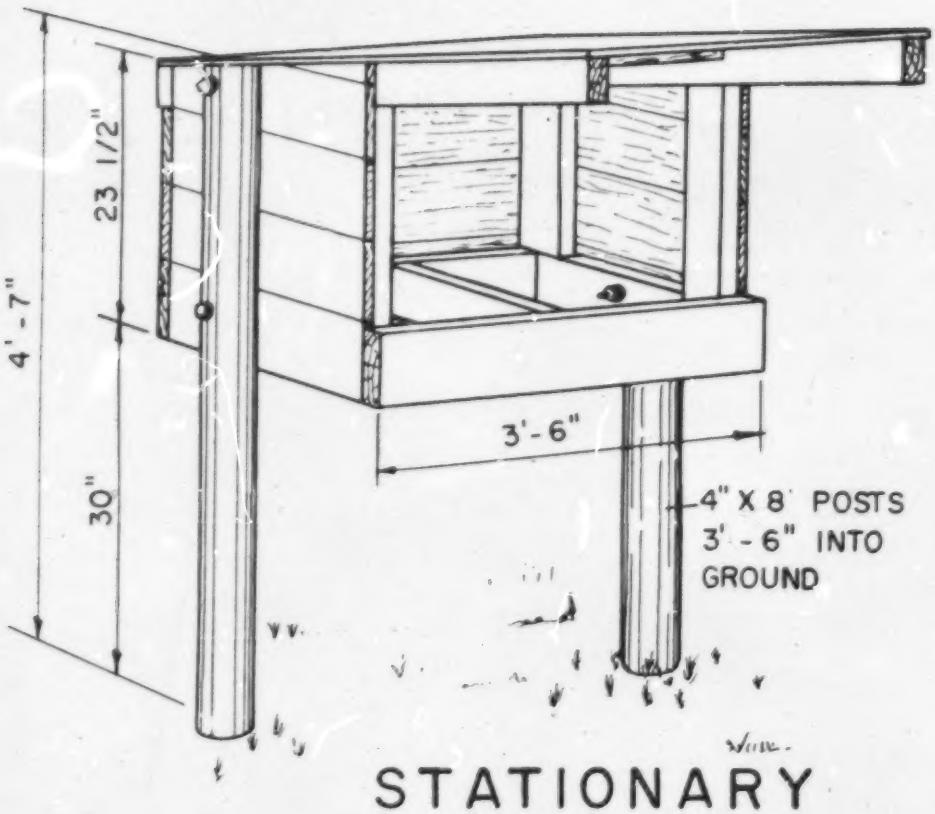


ELEVATION

106-9-3A

Source: Beef Housing and Equipment Handbook, MWPS-6.

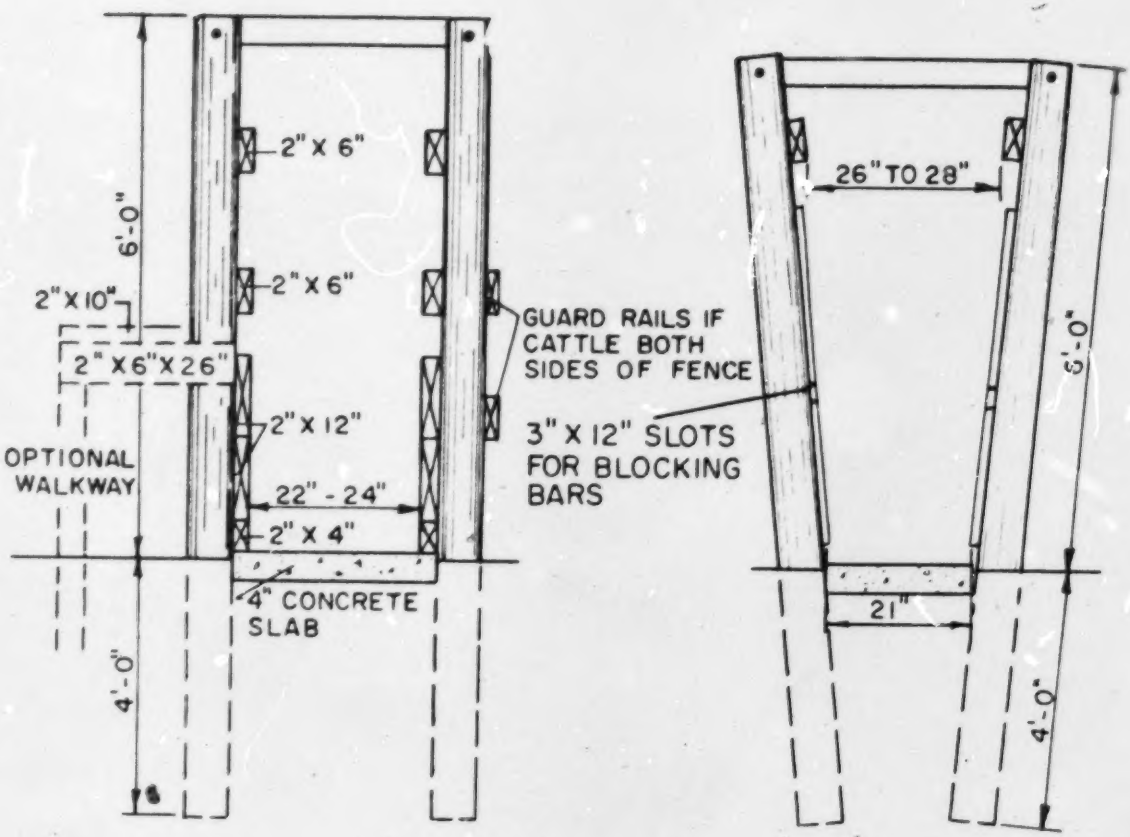
SALT/MINERAL FEEDER



STATIONARY

106-9-3B

Source: Beef Housing and Equipment Handbook, MWPS-6.

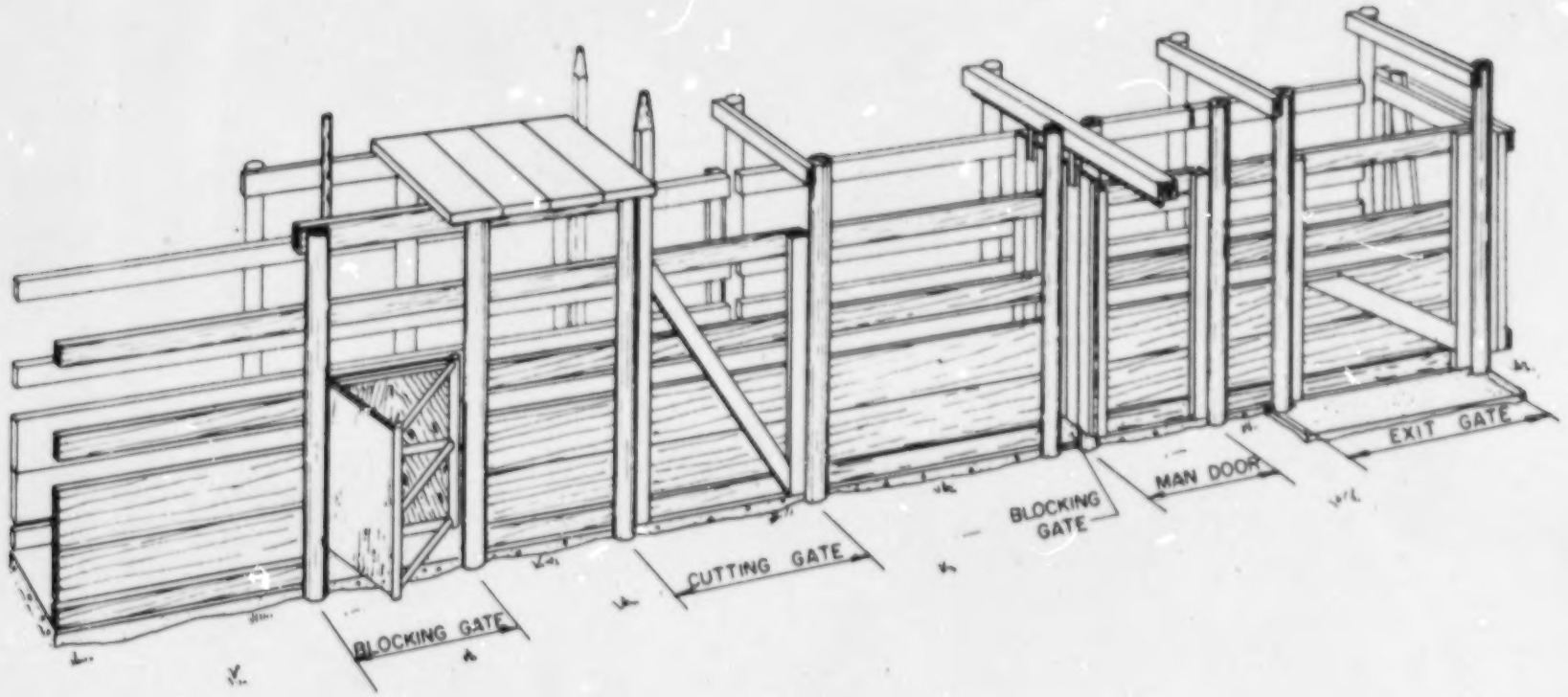


WORKING CHUTES

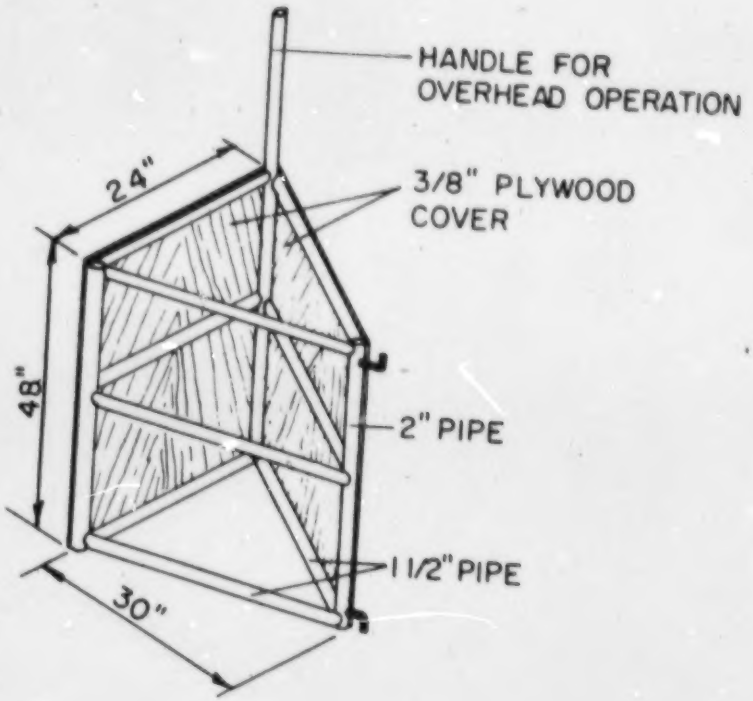
106-9-4A

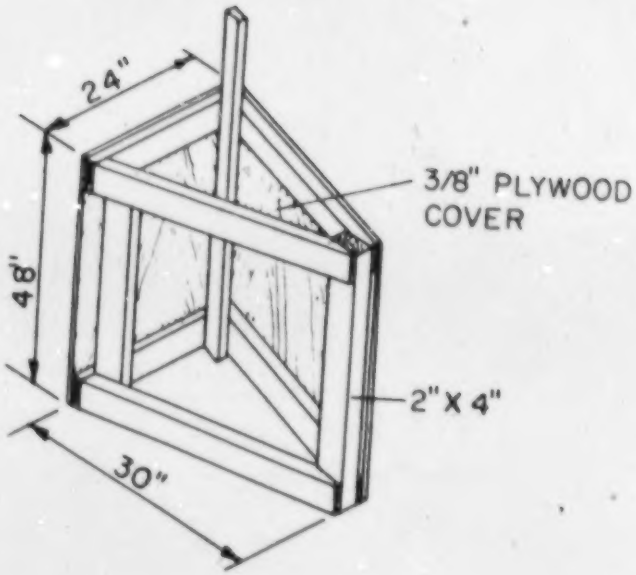
Source: Beef Housing and Equipment Handbook, MWPS-6.

WORKING CHUTE



Source: Beef Housing and Equipment Handbook, MWPS-6.





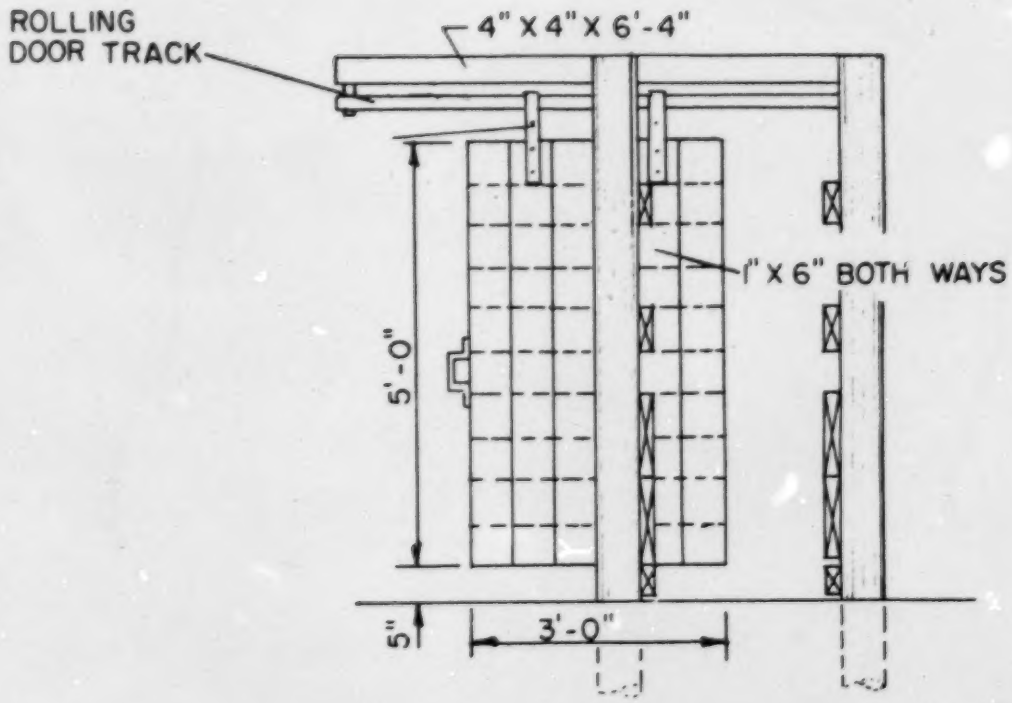
BLOCKING GATES

[redacted]

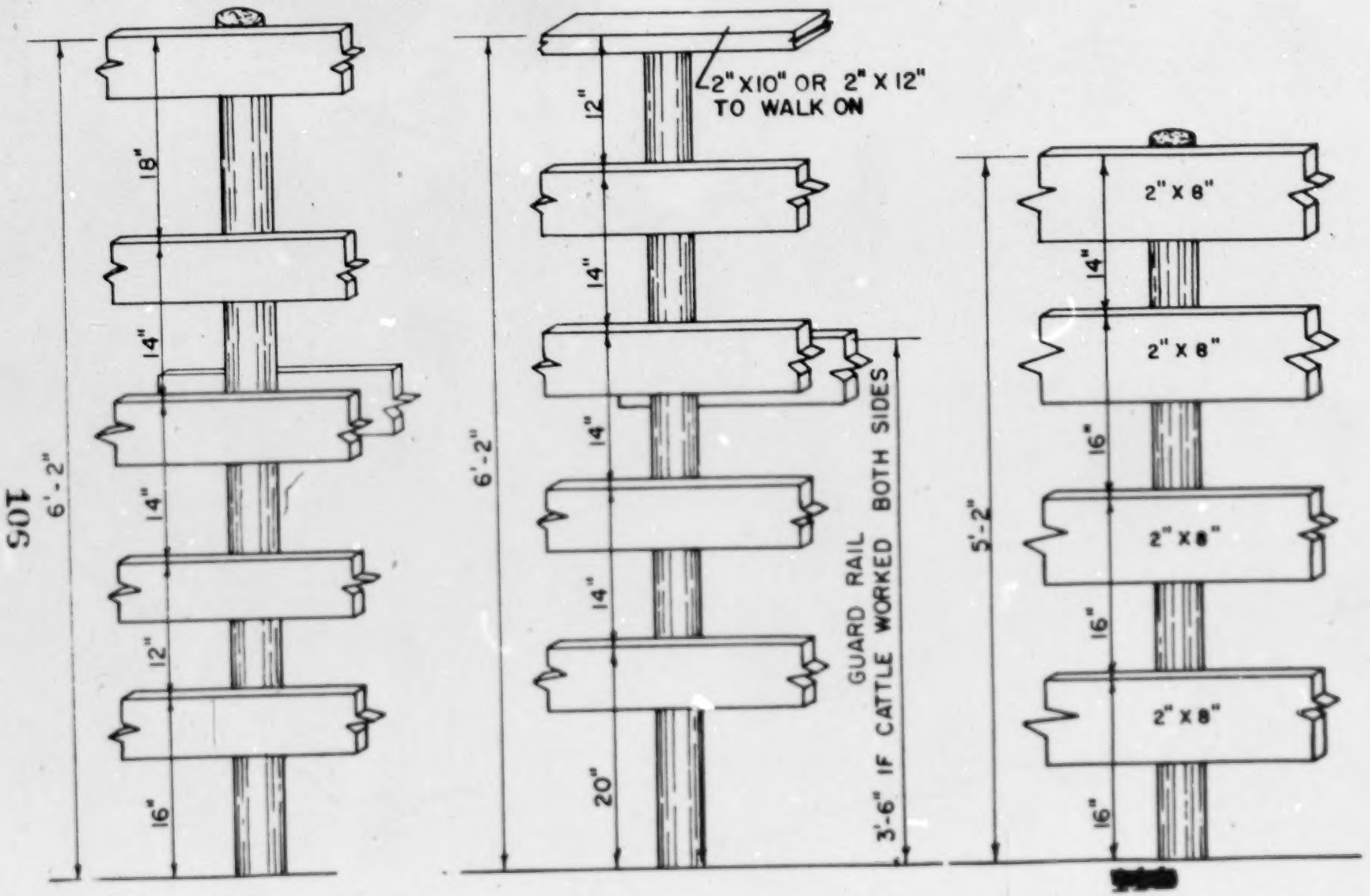
Source: Beef Housing and Equipment Handbook, MWPS-6.

[redacted]

BLOCKING GATE



Source: Beef Housing and Equipment Handbook, MWPS-6.



4" TOP POSTS 6' O.C.

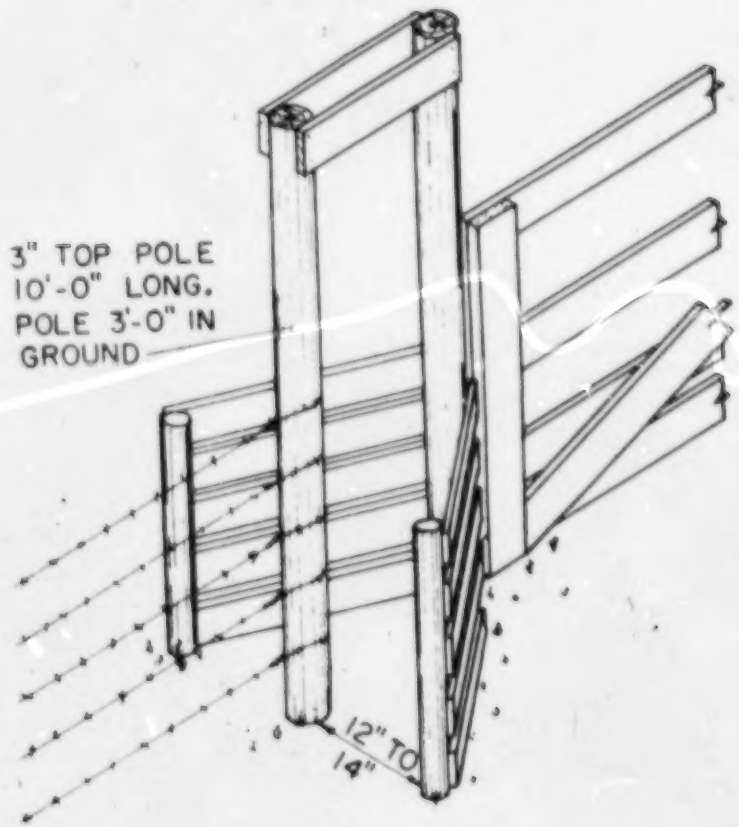
2" X 6" PLANK FOR LARGER AREAS

4" TOP POSTS 8' O.C.

Source: Beef Housing and Equipment Handbook, MWPS-6.

106-9-6

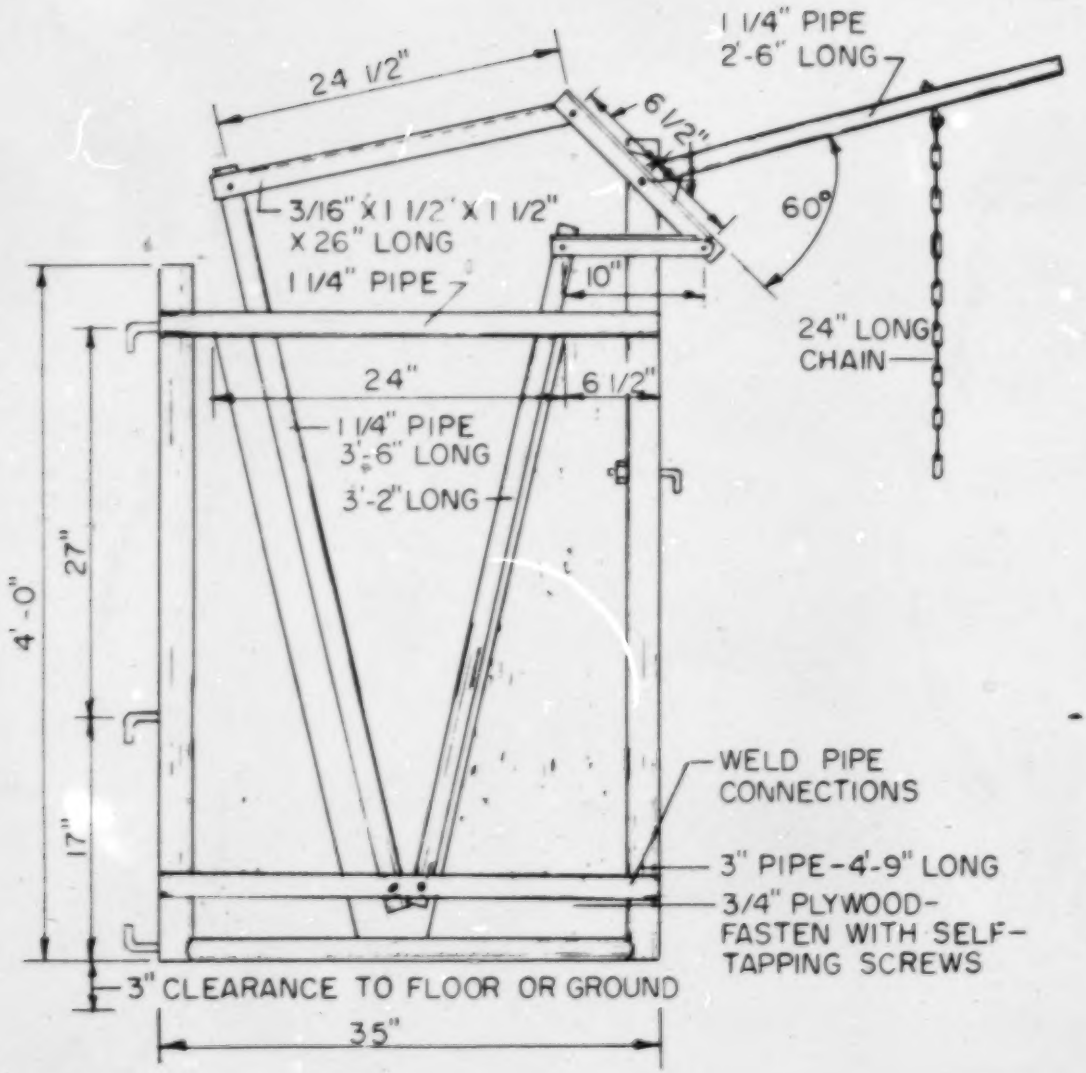
FENCE PASS



MAN PASS

Source: Beef Housing and Equipment Handbook, MWPS-6.

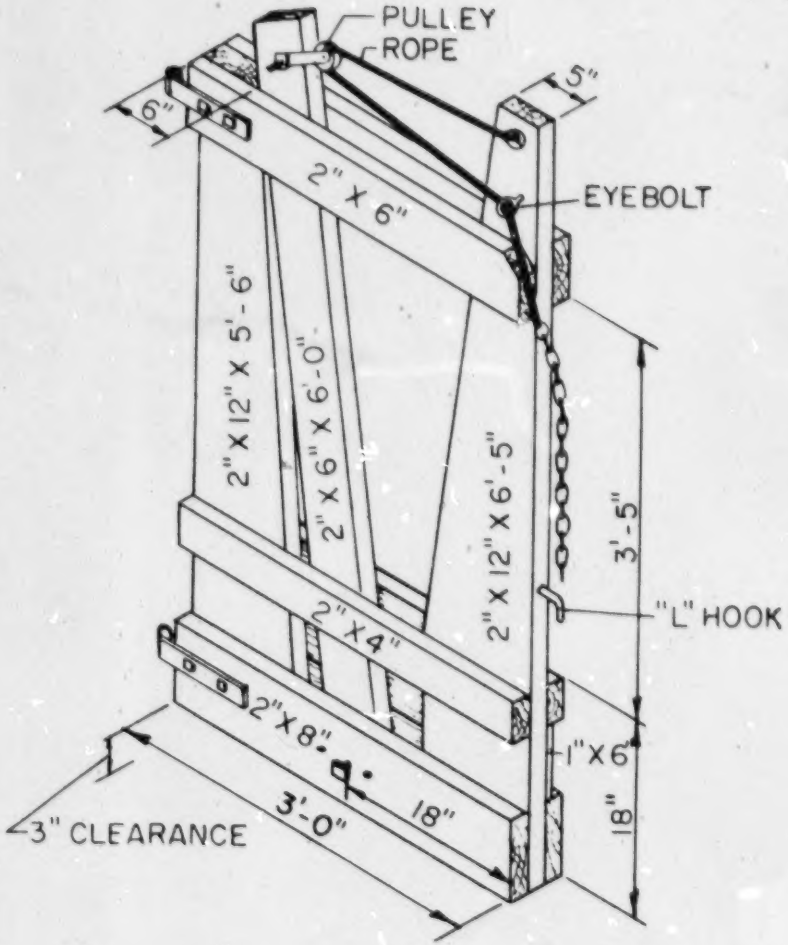
HEADGATE - METAL

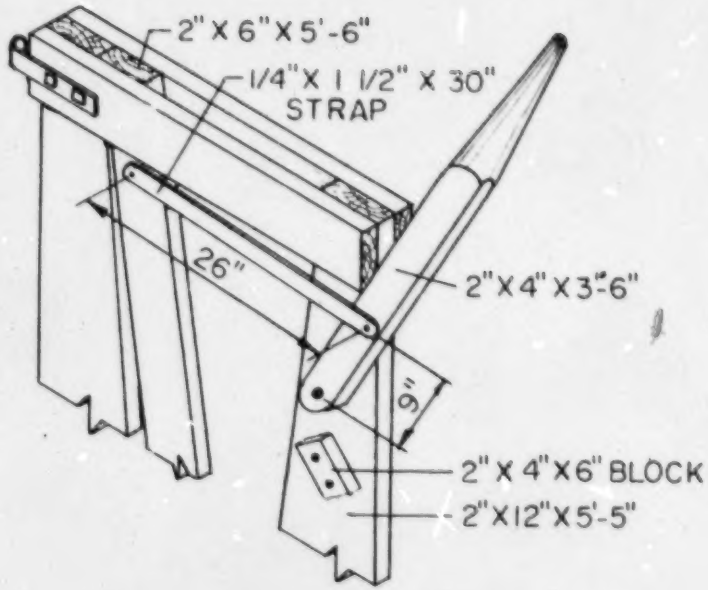


Source: Beef Housing and Equipment Handbook, MWPS-6.

106-9-8A

HEAD GATE - WOOD

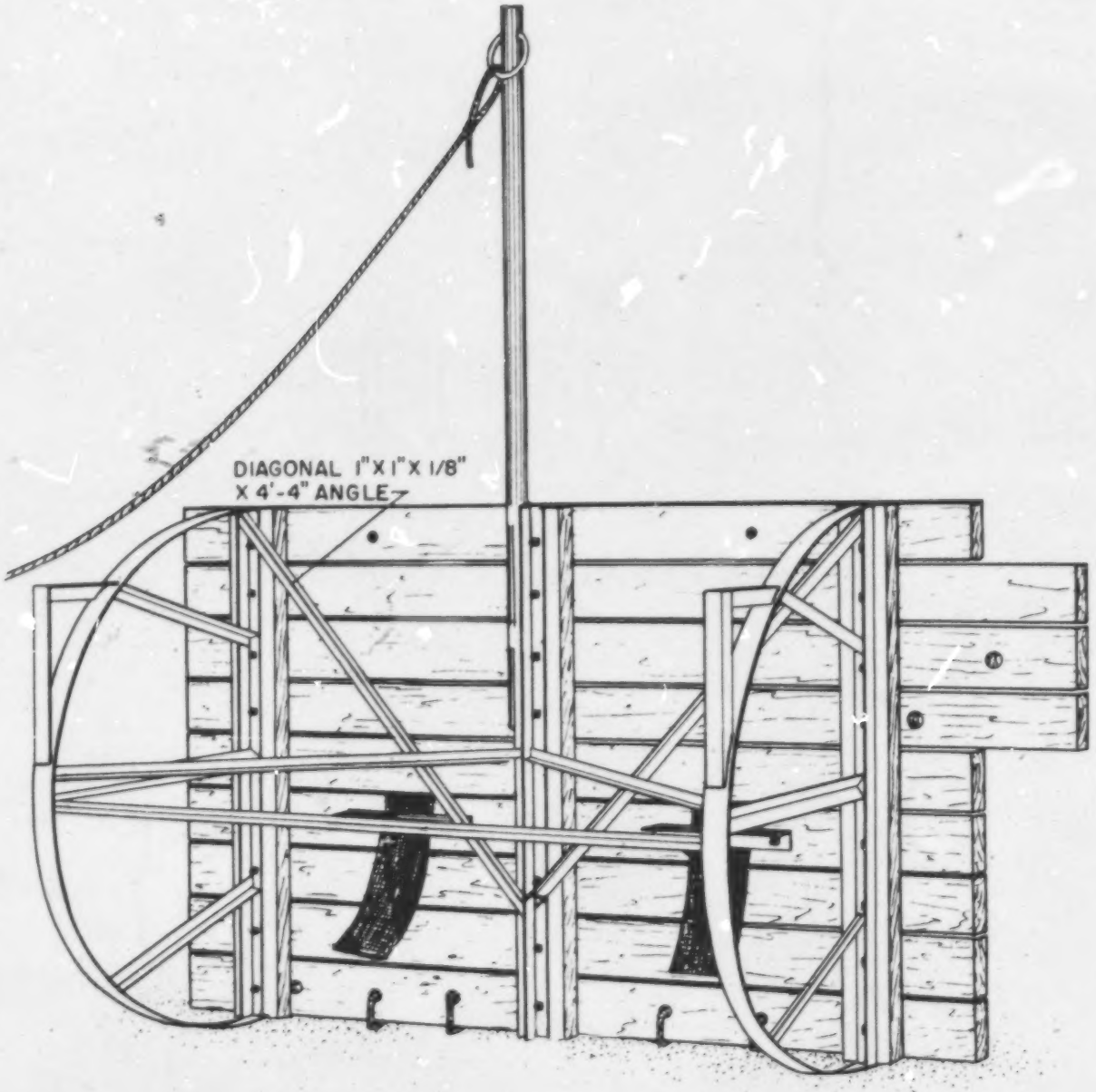




OPTION

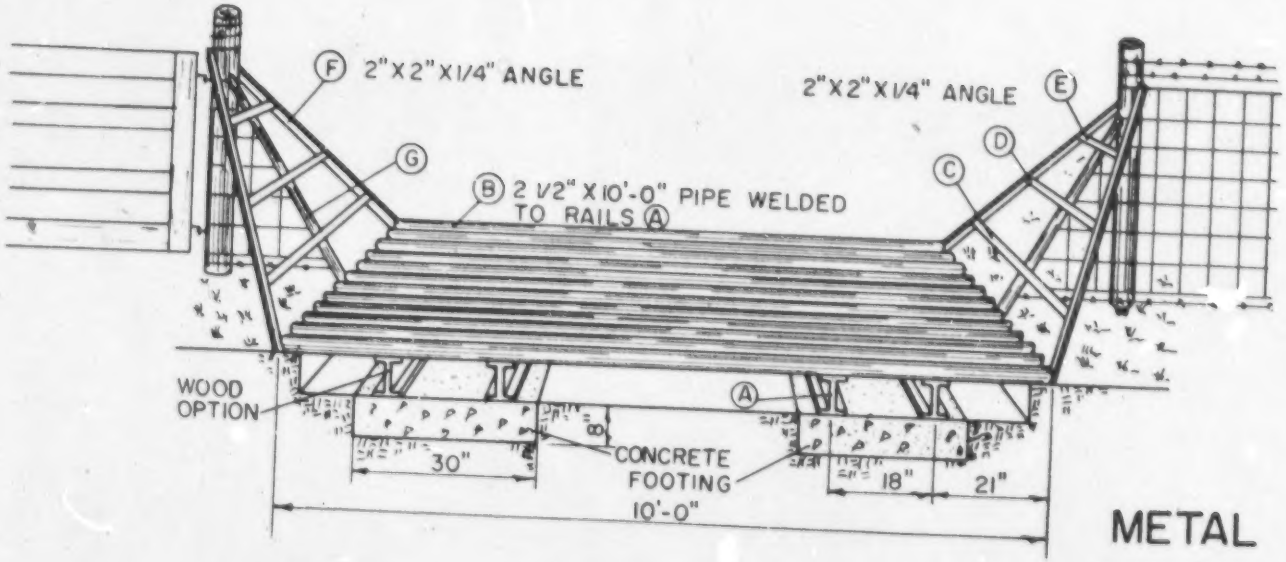
Source: Beef Housing and Equipment Handbook, MWPS-6.

HOOF TRIMMING TABLE



Source: Beef Housing and Equipment Handbook, MWPS-6.

CATTLE GUARD



Source: Beef Housing and Equipment Handbook, MWPS-6.

106-9-10

Lesson 10

ADOPTING A COMPREHENSIVE MANAGEMENT PLAN

Objective -- To develop the effective ability of farmers to adopt a comprehensive beef management plan.

Problem and Analysis -- How can we produce more beef from home-grown feeds?

-Phases of profitable calf management
-Profitable management of the beef cow

Content

Introduction. This lesson is based on the four-phase beef production program developed by beef scientists for Kentucky beef producers. It is designed for cow-calf producers and places special emphasis on the management of the calf.

I. Phases of Profitable Calf Management.

A. Weaning phase:
1. Cows should be bred between May 20 and August 5, so they will drop calves during the 75 days between March 1 and May 15.
2. All calves should be weaned by November 1 and weigh at least 400 pounds.
3. No supplemental feeding of calves should be done; this will hold cost down and gains can be made up on grass the following spring.
4. At weaning, all calves should be wormed, castrated, dehorned, and implanted with growth hormones (heifers kept for replacements should not be implanted).

B. Growing phase:
1. This period lasts from November 1 to April 15, or 163 days (from weaning to grass time).
2. Calves should be fed to gain 1.0 - 1.5#/day. This gain will cause cattle to remain thrifty and still allow costs to be controlled.
3. Gains should be held in the range of 1.0 - 1.5#/day.
4. These gains should be put on as economically as possible.
5. The following rations have produced an average daily gain of one pound.

Ingredient	Lb./steer/day	163 day-requirement
Ration 1		
Corn silage	21.6	3521 lb.
Alfalfa hay	3.2	522 lb.
		ADG = 0.97 lb.
Ration 2		
Corn silage	24.90	4059 lb.
Ground shelled corn	0.87	142 lb.
Urea 281	0.13	21 lb.
		ADG = 0.97 lb.
Ration 3		
Orchardgrass-clover alfalfa hay	15.2	2478
Soybean meal	1.1	179
		ADG = 1.18 lb.

6. The following rations have produced 1.5# ADG.

Ingredient	Lb/steer/day	163 day-requirement
Orchard grass-clover alfalfa hay	12.5	2038 lb.
Ground shelled corn	4.0	652 lb.
Soybean meal	1.13	184 lb.
		ADG = 1.54
Corn silage	32.7	5330 lb.
Soybean meal	1.5	244 lb.
		ADG = 1.50

(continued on next page)

Ingredient	Lb/steer/day	163 day-requirement
Corn silage	37.30	6080 lb.
Soybean meal	1.13	184 lb.
		ADG - 1.64

7. Miscellaneous nutrient requirements:
   a. Salt - 5.75 oz./steer/163 days.
   b. Vitamin A.
8. Final weight calculation: Weaning Weight = 400# + 163 days at 1.25/day = 400 + 204 = 604 pounds.

C. Grazing Phase:
1. This phase begins when the grass season starts (about April 15) and lasts until the strong part of the grass season reaches its peak and starts to decline.
2. ADG should be about 2.0#/day on grass.
3. Salt should be provided on a free-choice basis.
4. Vitamin A supplement should also be made available.
5. Final weight calculation: 604# + 2.0# ADG x 76 days = 604 + 152 = 756 pounds.

D. Finishing Phase:
1. This period lasts from the time when grass gains begin to drop until cattle reach market weight (July to about November 1, or about 123 days).
2. ADG should be about 2.2#/day.
3. Cattle should be put on a self-feeder.
4. To get cattle on feed:
   a. For the first week, feed 60% ground shelled corn, 40% corn-cob meal.
   b. The second week, feed 80% ground shelled corn + 20% corn-cob meal.
   c. The third week, feed 100% ground shelled corn.
5. Grain requirements per steer (approximately)
   a. Per steer per day, 19# ground shelled corn.
   b. Per steer for 123 days, 2300# ground shelled corn.
6. Corn-cob requirements
   a. Per steer per day, 1st week - 7.2#.
   b. Per steer per day, 2nd week - 3.6#.
   c. Total. 23#/steer.
7. Final weight calculation:
   756# starting weight + 123 days x 2.2#/ADG = 756# + 271# = 1027
8. Miscellaneous nutrient requirements.
   a. Salt - 2.18 oz. per steer/123 days.
   b. Vitamin A supplement.

II. Suggestions for Profitable Management of the Beef Cow.

A. Cows should be grazed as long as possible throughout the year. A good grass-legume pasture should be made available.

B. Winter feed needs of cows will average 140# ground shelled corn and 1963# grass hay (for a 1,000 lb. cow).

C. Miscellaneous nutrients required are:
1. Salt
2. Vitamin A
3. Bone meal
4. Magnesium oxide

Suggestions for Teaching the Lesson

I. Developing the Situation.

A. Things to be brought out by the teacher:
1. We are utilizing less than 70 % of our grass and other home-grown feeds.
2. Statewide, Kentucky beef production is at about 65% of capacity.
3. The use of the potential feed in the county would greatly increase farm income.

B. Things to be brought out by class members:
1. Amount of unused forage or grain supplies per farm.
2. Present levels of forage production.
3. Their present plan of operation.
4. Experience with other systems of production.

II. Conclusions.

A. The herd should be managed so that calving occurs within a narrow interval of time, 75 days.

B. Calving should begin so that 400 lb. or heavier calves can be weaned by November 1.

C. Costs can be reduced by eliminating supplemental (crop) feeding during the nursing period.

D. All calves should be wormed, castrated, dehorned, and implanted by the time they are weaned.

E. All calves should be wintered to gain 1 - 1.5 lbs. per day, on as economical feed as possible.

F. Yearling calves should be ready to go on grass at about 600 lbs. and should gain about 2 lbs. per day.

G. When grass gains decline, place cattle on full feed by employing a gradual method of introducing grains.

H. Keep cattle on grain for 120 days to improve grade and carcass quality.

I. Sell cattle upon reaching desired market grade.

J. Maintain beef cows on grass throughout the grazing season; winter economically while maintaining health.

III. Enrichment Activities.

A. Visit a successful cow-calf operation.

B. Secure Extension Beef Specialist to speak to the class.

C. Work with class members in improving others individual beef plans.

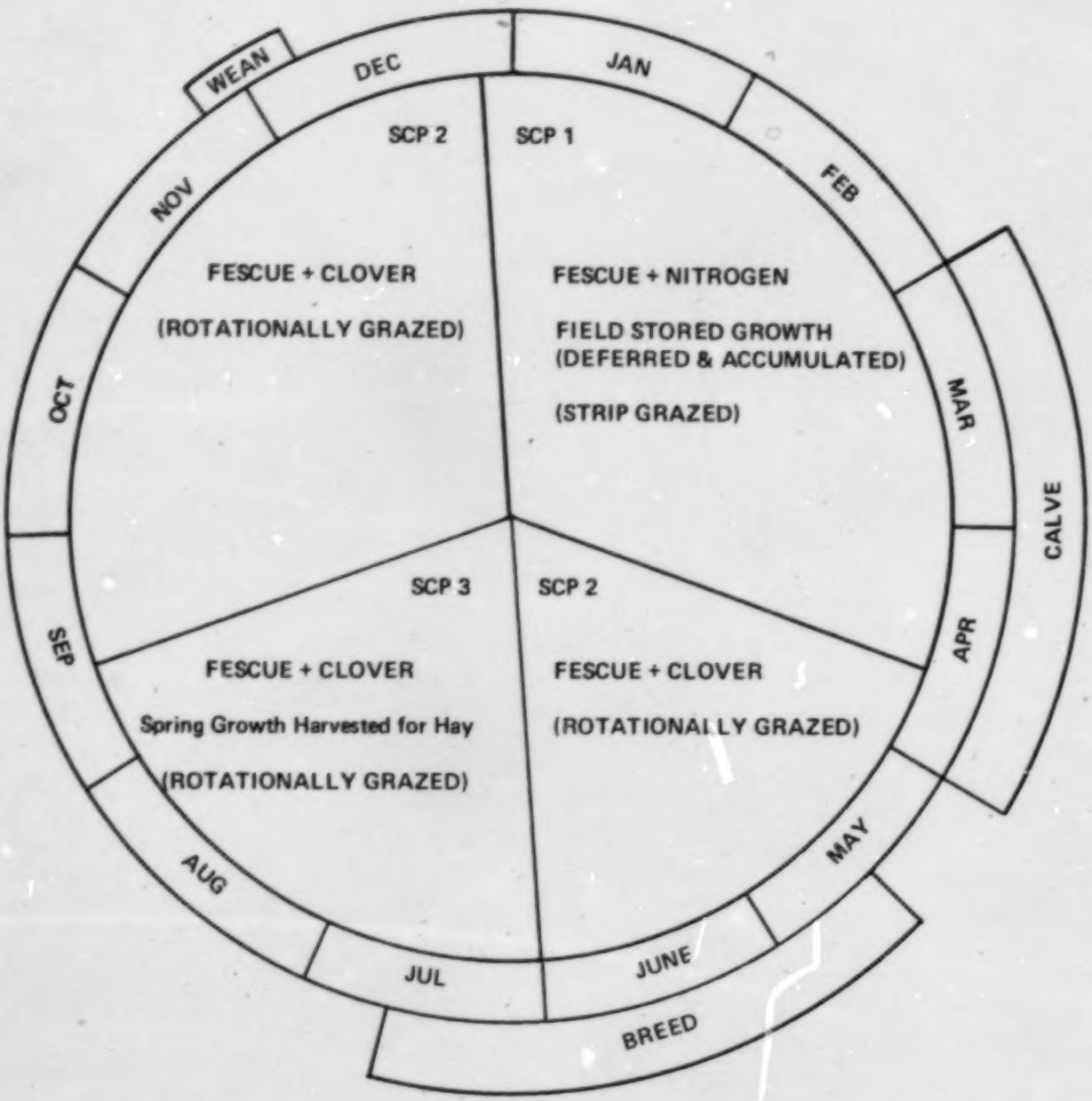
D. Develop and show a slide series emphasizing different phases of the beef operation.

IV. Suggested Teaching Materials.

A. References
1. Ky. Bulletin ID-5 Beef Forage Systems.
2. Ky. Bulletin 1306 4H Graze More Beef.

B. Audio-visuals
1. Masters
-1 Cow-Forage Calendar Clock
-2A-C Pasture Availability Curves
-3 Annual Energy Demand Curve of the Beef Cow and Calf
-4 Forage Management Fields for Year
-5 Guide to Grazing Management
-6 Nutrient Values of Pasture
-7A-B Calendar of Management Suggestions (monthly)
-8 Adapted Pasture Plants for Kentucky
-9 Factors in Pasture Plant Selection
-10 Approximate Grazing Periods of Pasture Plants in Kentucky
-11 Pasture Mixtures

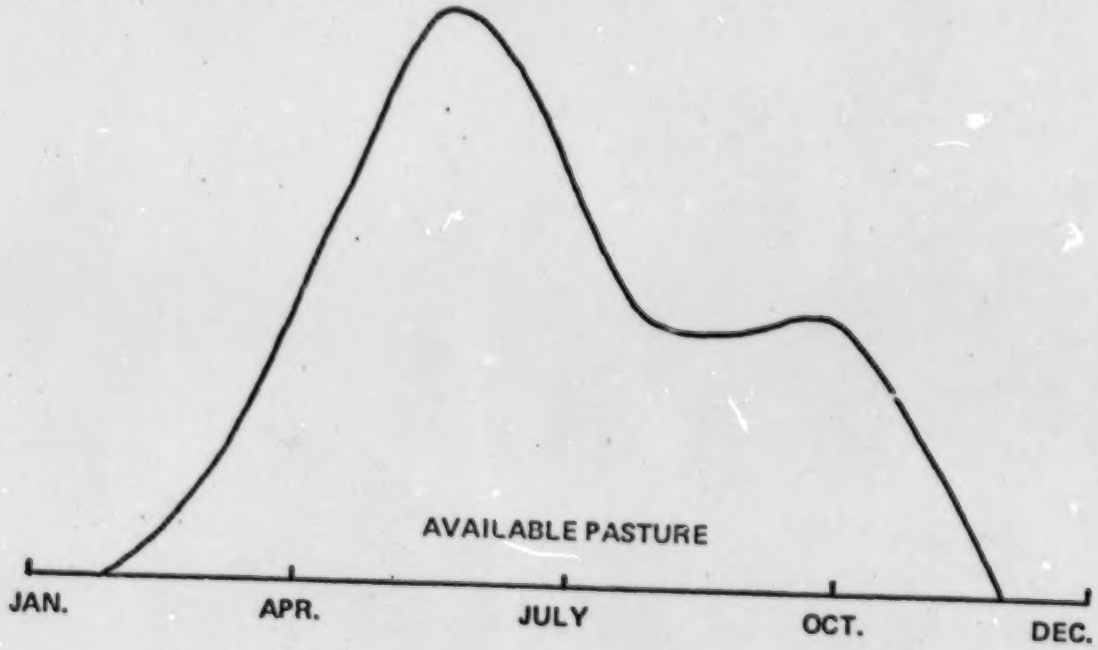
Cow-forage Calendar Clock



SOURCE: Beef Forage Systems

106-10-1

GENERALIZED PASTURE AVAILABILITY CURVE FOR
COOL SEASON PERENNIAL GRASSES



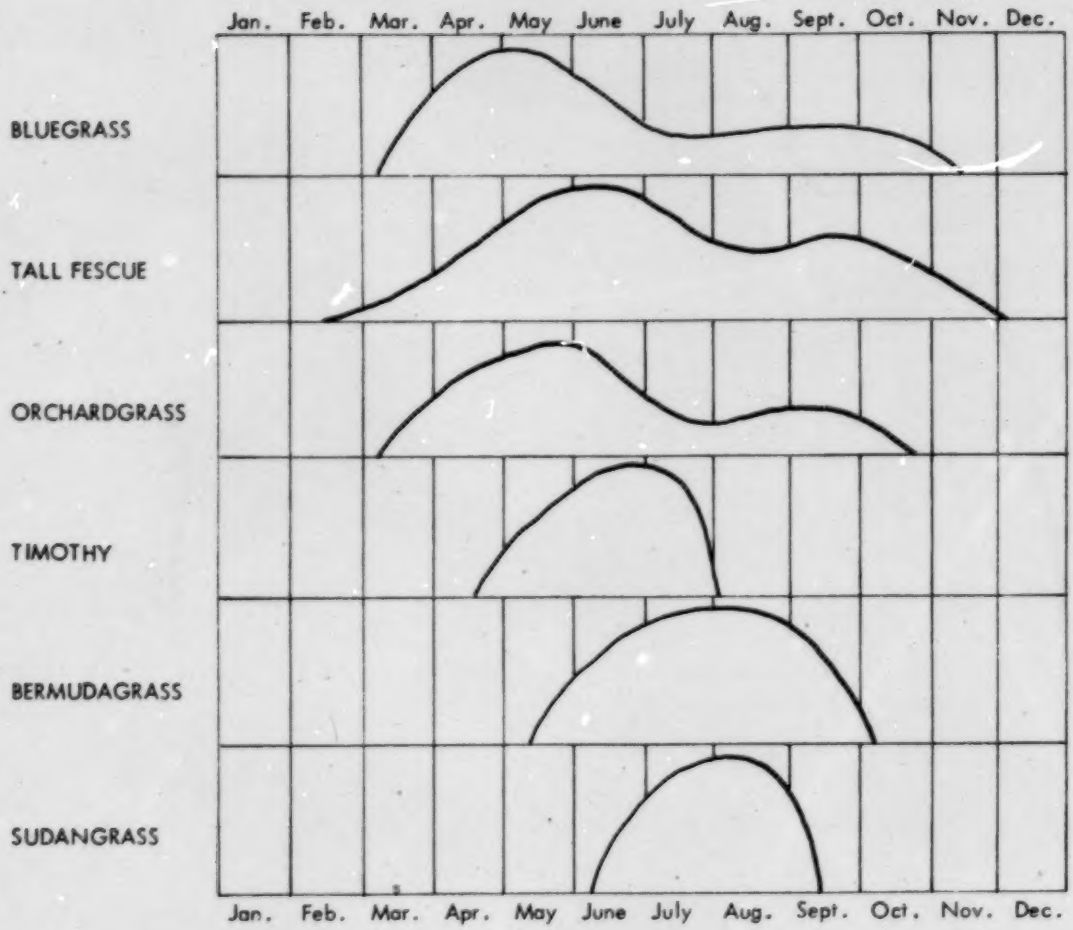
SOURCE: Templeton, et al. 1970. University of Kentucky Bulletin 709.

[redacted]

106-10-2A

[redacted]

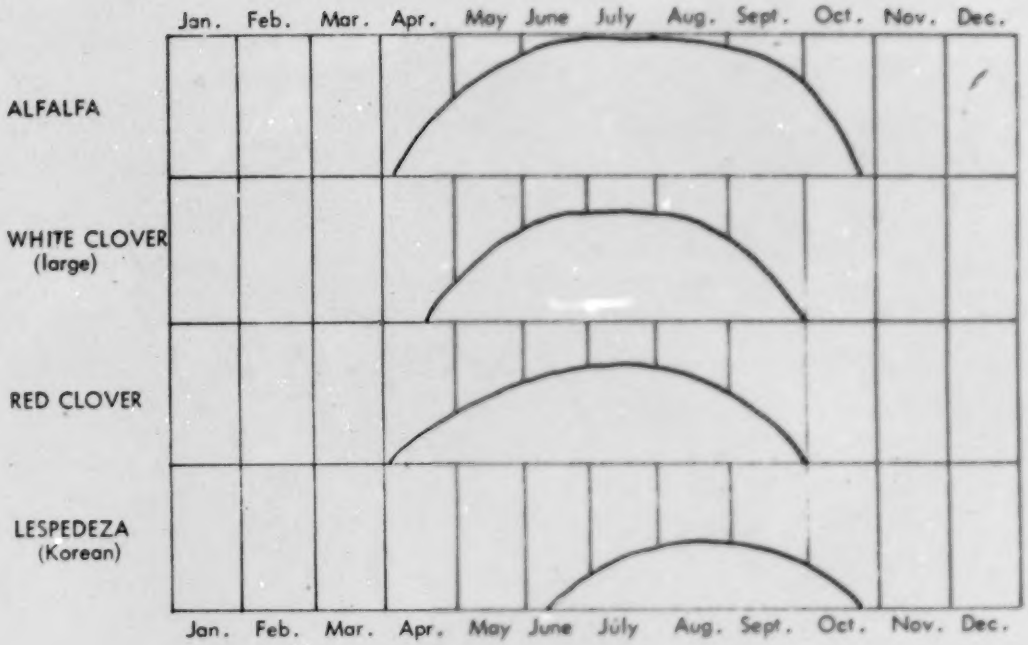
GRASS AVAILABILITY CURVES



Source: Graze More Beef

106-10-2B

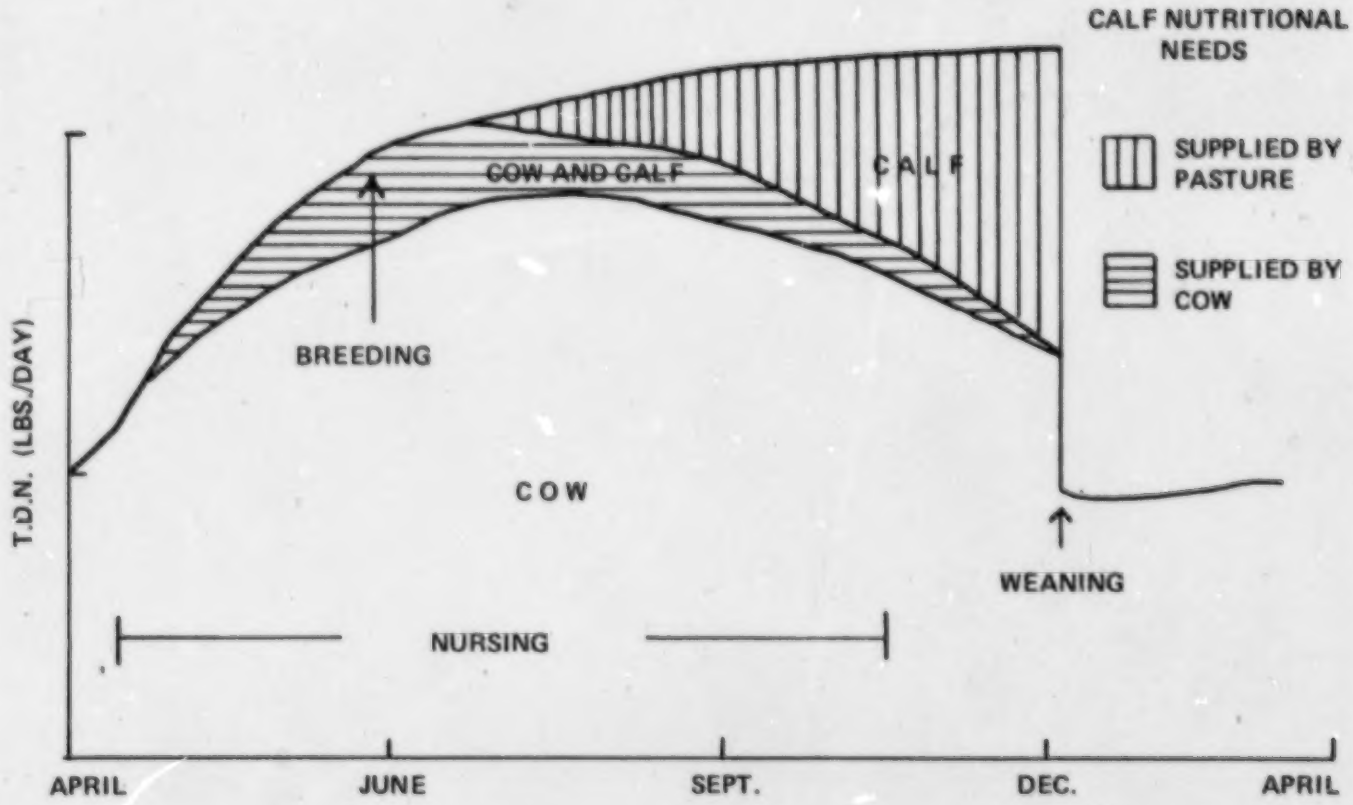
LEGUME AVAILABILITY CURVES


Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
ALFALFA
WHITE CLOVER (large)
RED CLOVER
LESPEDEZA (Korean)
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Source: Graze More Beef

106-10-2C

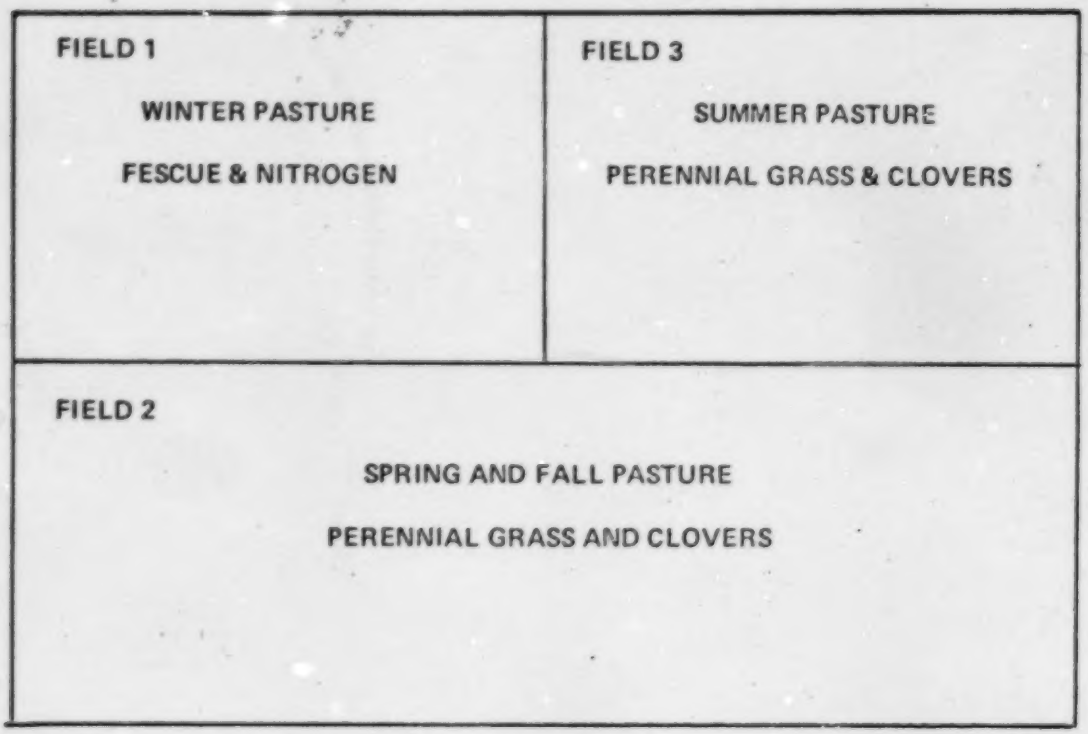
THE ANNUAL ENERGY DEMAND CURVE OF
THE SPRING CALVING BEEF COW AND CALF



Source: Beef Forage Systems

106-10-3

FORAGE "MANAGEMENT FIELDS" FOR
YEAR-ROUND FORAGE SUPPLY



Source: Beef Forage Systems

106-10-4

GUIDE TO GRAZING MANAGEMENT

Source: Graze More Beef

106-10-5

NUTRIENT VALUES OF PASTURE

Green Grasses = 63% of Protein is Digestible

Green Legumes = 75% of Protein is Digestible

ACRE OF "GOOD PASTURE" WILL

PROVIDE TOTAL DIGESTIBLE NUTRIENTS (TDN)

EQUAL TO:

44 bushels of corn

(or)

90 bushels of oats

(or)

42 bushels of wheat

(or)

2 tons of excellent hay

CALENDAR OF MANAGEMENT SUGGESTIONS

January

Keep herd in thrifty condition
Test forage and supplement if needed
Treat for lice

February

Provide vitamin A, protein and phosphorous
Add Mg to salt mix

March

Manage the calving operation
Increase feed to nursing cows

April

Fertility test bulls
Keep records on calves
Prepare for pasture season
Start fly control

May

Vaccinate cows for Lepto and Vibrio before breeding
Put cows on grass; rotate pastures
Turn bulls in May 20
Breed heifers 3-4 weeks earlier
Spray for flies

June

Vaccinate calves
Implant, castrate, and dehorn calves
Turn in clean-up bulls June 12
Rotate pastures, secure surplus forage
Rotate bulls

July

Remove bulls July 20
Cull cows still in heat
Creep feed if pastures are poor
Rotate pastures
Control flies

August

Treat calves for internal parasites
Control flies
Rotate pastures

September

Pregnancy test cows
Cull open or unsound cows

October

Treat for grubs
Re-vaccinate calves (triple vaccine)
Vaccinate heifers for Lepto

November

Wean calves
Complete performance records
Select replacement heifers
Put bull calves on feed test
Cull open cows
Control lice
Supplement feed with vitamin A

December

Utilize aftermath forage
Treat for internal parasites
Control lice
Feed calves for gaining condition
Seek performance-proven bull, if needed

106-10-7B

SOURCE: Ky. Bulletin ID-14

ADAPTED PASTURE PLANTS FOR KENTUCKY

GRASSES

KY. BLUEGRASS
ORCHARDGRASS
REDTOP
TIMOTHY
TALL FESCUE
SMOOTH BROMEGRASS
BURMUDAGRASS (MIDLAND)
OTHERS

LEGUMES

WHITE CLOVER
RED CLOVER
LADINO CLOVER
KOREAN LESPEDEZA
ALSIKE CLOVER
BIRDSFOOT TREFOIL
ALFALFA
SWEET CLOVER
OTHERS

SPECIAL - USE PASTURE PLANTS

SUDANGRASS
MILLET
SUDANGRASS-SORGHUM HYBRIDS
RYE
WHEAT
BARLEY
OATS
OTHERS

FACTORS IN PASTURE PLANT SELECTION

1 TYPE OF LIVESTOCK ENTERPRISE

2 FORAGE QUALITY

3 PASTURE USES

4 THE GROWING SEASON

5 YEARLY FORAGE DISTRIBUTION

6 SOIL ADAPTATION

7 COMPATABILITY WITH OTHER PLANTS

8 DROUGHT RESISTANCE

9 DISEASE RESISTANCE

10 WINTER HARDINESS

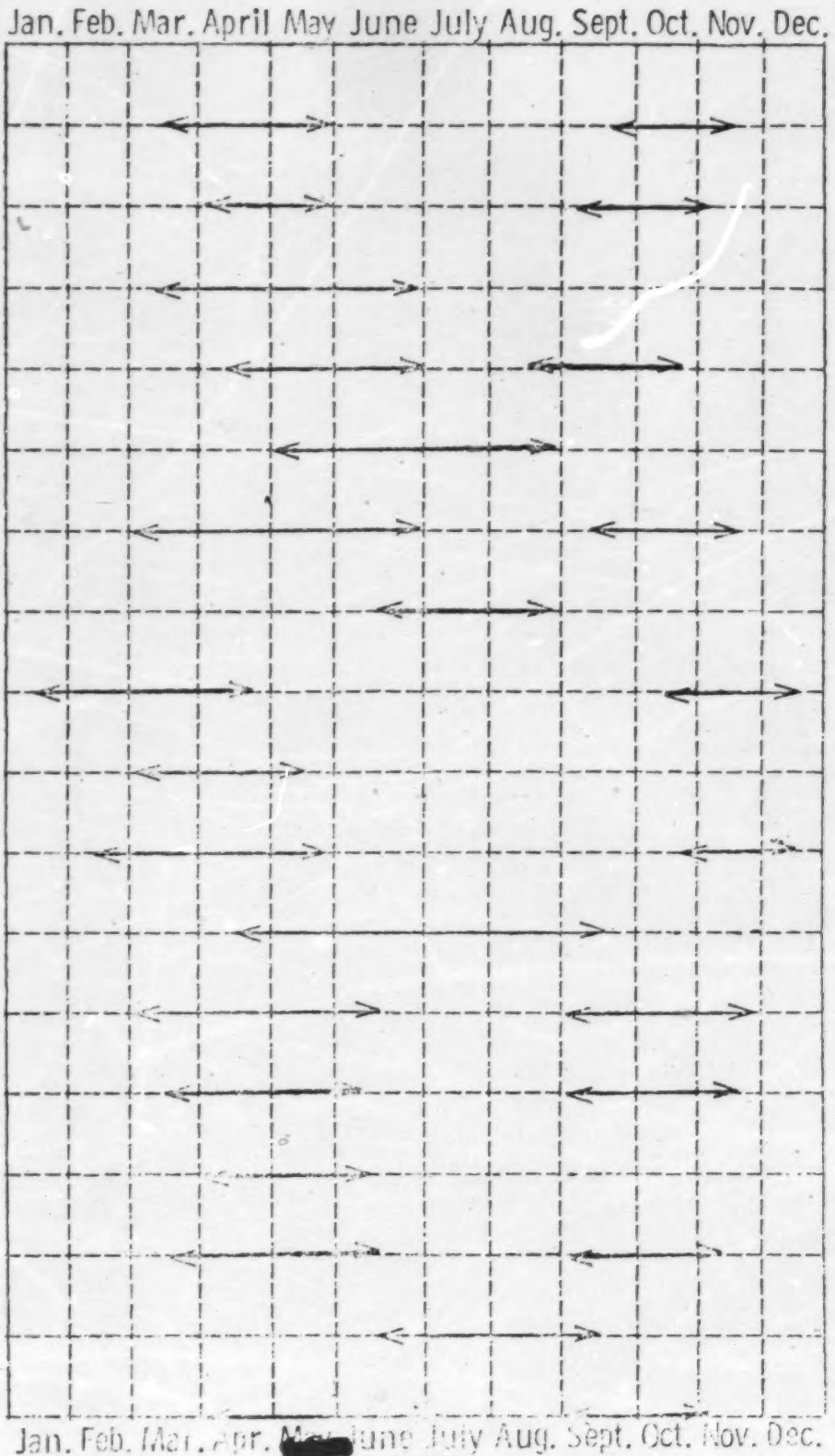
11 SEED PRODUCTION

12 LABOR AVAILABLE ON FARM

13 SEED COST

14 OTHERS

APPROXIMATE GRAZING PERIODS OF PASTURE PLANTS IN KENTUCKY



PASTURE MIXTURES

SAMPLE MIXTURE - (HIGHLY PRODUCTIVE SOIL)

RED CLOVER
ORCHARDGRASS
LESPEDEZA

SAMPLE MIXTURE - (MEDIUM FERTILITY SOIL)

FESCUE
WHITE CLOVER
LESPEDEZA

SAMPLE MIXTURE - (WET LAND CONDITIONS)

FESCUE
LESPEDEZA
SWEET CLOVER

APPENDIX

MY TEACHING PLAN FOR THIS COURSE

Why I am teaching this course (major learnings or outcomes expected)

ARRANGEMENTS FOR THE COURSE

Session No.	Date	Topic	Clock Hours

This page is for your convenience in planning and rearranging the content of this course to meet local needs and interests. Plan the course as it will be taught in the local school, showing the dates, class session number, topics, and the time in hours allocated to each topic.

TOPIC PLANNING FOR THIS COURSE

Name of Course _____

Name of Topic _____

Number of Class Meetings Allotted for this Topic _____

Teaching Objectives: (Learnings or outcomes for those enrolled)

Major Phases of the Topic: (Problems, jobs, areas, skills, key points, understandings, etc.)

Learning Activities: (Field trips, completing summary forms, panel discussions, demonstrations, etc.)

Teaching Materials Needed: (From resource material list or file)

RESOURCE MATERIALS FOR TEACHING

Unit _____ Lesson _____

Reference Books	Date Used	File Location

Other References: Bulletins, Magazines, Etc.		

Audio-Visuals: Slides, Filmstrips, Motion Pictures		

Magnetic, Flannel, and Bulletin Boards		

Charts, Maps, Posters		

Transparencies		

Specimens, Models, Mounts		

Human and Community Resources		

Please complete and return to:
Maynard J. Iverson
7 Dickey Hall
University of Kentucky
Lexington, Kentucky 40506

ADULT INSTRUCTIONAL UNIT EVALUATION

-- A Questionnaire for Kentucky VoAg Teachers of Adults

PART I -- GENERAL INFORMATION

How many years of teaching experience do you have? _____

How many years have you taught adults in agriculture? _____

How long has it been since you have taken your last college classwork in agriculture_____; in education _____; (undergraduate, graduate, or non-credit course)? _____

What is the highest degree you hold? _____

How many teachers are in your department?_____

What age level students do you teach? (✓one)
a) ____high school and adult b)_____adult only

How many other units from the University of Kentucky have you used in your teaching during the past few years?_____

PART II -- UNIT INFORMATION

NAME OF UNIT EVALUATED:_____

TYPE OF CLIENTELE TAUGHT: _____Adult Farmer _____Young Farmer
_____Other Adults (please specify)_____

Average number attending class _____

Was the interest level _____high? _____moderate? _____low?

How many lessons did you use?_____ How many class periods?_____

Indicate any lesson you added or deleted_____

_____

_____

_____

Directions: Place a check mark (✓) in the appropriate left hand column to rate the following components of the unit based on your own observations. A ranking of 5 represents an excellent rating decreasing to a rank of 1 for poor. For the open-ended questions please write on the back if additional space is needed.

Unit Design

5	4	3	2	1	
☐	☐	☐	☐	☐	General arrangement of parts
☐	☐	☐	☐	☐	Appropriateness of format for teaching adults
☐	☐	☐	☐	☐	Length of the unit
☐	☐	☐	☐	☐	Usefulness of suggestions for using the unit
☐	☐	☐	☐	☐	Number of lessons
☐	☐	☐	☐	☐	Order of lessons

Specific comments:_____

_____

PLEASE CONTINUE ON NEXT PAGE

Objectives in the Unit

5 4 3 2 1

_____ Clearly stated
_____ Reasonable to reach in the allotted time
_____ Relevant to needs of the adult learner
Specific comments: _____

_____

Technical Content

5 4 3 2 1

_____ Usefulness of introductory material
_____ Sufficiently detailed for direct use in class
_____ Related to objectives
_____ Divided into appropriate problem areas
_____ Up-to-date
_____ Accuracy
_____ Reasonably complete
Specific comments: _____

_____

Suggestions for Teaching the Lessons

5 4 3 2 1

_____ Appropriate information for the teacher to bring out
_____ Appropriate items to be secured from class members
_____ Suitable conclusions
_____ Suitability of enrichment activities
Specific comments: _____

_____

Resources and Teaching Aids in the Unit

5 4 3 2 1

_____ Up-to-date
_____ Accessibility to the teacher
_____ Relevance to the unit
_____ Adaptability to the teaching plan
Specific comments: _____

_____

With what parts of the unit do you feel you need additional help?

____None of them
____Objectives
____Content
____Course organization and planning
____References
____Resources and teaching materials
____Teaching methods
____Other (Specify) _____

PART III -- GENERAL REACTION

Please indicate any other strengths and weaknesses that you have observed in the unit and any suggestions for improvement, revision, and/or implementation (use the back of this sheet if needed).